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ADSE650
User Manual

PITOT STATIC TESTER

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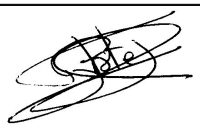
Author	F. PLATEL	
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Introduction

The purpose of this manual is to provide the user with the information required to implement and operate the ADSE650 Pitot Static Tester.

Exhibit 1:General view of ADSE650

1. PRESENTATION

1.1 General

The ADSE650 pressure controller is housed in a very robust housing box, able to be moved directly to the aircraft on the tarmac or in the hangar to proceed "in situ" to the tests of equipment fitted to the aircraft.

The two parts of ADSE650:

- The Electro Pneumatic Unit (EPU) includes the computer, the pressure measurement and regulation devices, the security systems as well as the pressure and vacuum pumps necessary for independent operation in generation mode,
- The Remote Control Unit (RCU), located in the cover of the housing box, includes the Human Machine Interface. It consists of a Tablet PC with Windows 8 Pro fitted with a watertight touch sensitive plate displaying the static (Ps) and total (Pt) pressure parameters (functions, measurement units, commands, rate of change, nominal values, program number, flight limit number).

RCU and EPU are connected through the Wifi. (In case of problem with the wifi, a cable can be connected between RCU and EPU)

The ergonomics of the ADSE650 caters for:

- Excellent readability of the information,
- Easy programming of the configuration (interactive menus, with explanations and indication of potential handling errors),
- Direct calibration by the user.

1.2 Applications

The ADSE650 pressure generator/controller has been specially designed to simplify pressure tests on equipment fitted on the aircraft (altimeter, air speed indicator, rate of climb indicator, air data computers ...) would it be in the workshop, in the hangar or directly on the tarmac.

The computer manages the security systems, the measurement and regulation devices from the remote control unit with following operating functions:

- In "Measure" or "Manual" mode, independently or simultaneously on both static (Ps) and total (Pt) pressure channels:
  - Measurement or generation of static (Ps) pressures (altitude),
  - Measurement or generation of total (Pt) pressures (air speed /MACH number),
  - Chronometric measurement of leak rate.
- In "Program" mode, independently or simultaneously on both static (Ps) and total (Pt) pressure channels:
  - "Flight domains" writing,
  - "Automatic test" programs writing,
  - Execution of the written programs. In this mode, the operator can choose to enter at each program step the actual data read on the equipment under test, or to let the program run and to note manually the values read on the equipment under test.
- Security:
  - Full time survey of all the flight domain limits parameters,
  - Re-connection of the pressure circuits to the atmospheric pressure through manual flow adjustable valves in case of power supply network cut-off,
  - Self test of all the ADSE650 internal functions each time the equipment gets switched on.

- Calibration:
  - The calibration of the ADSE650 pressure transducers can be fulfilled easily by the maintenance manager.
- Baro-setting:
  - The baro-setting (Ref) adjustment is performed by the operator himself and remains displayed permanently.
- Altitude difference (between the bench position and the equipment under test):
  - The operator can introduce in the measurement process the altitude difference between the bench on the ground and the equipment fitted in the aircraft cockpit.

1.3 Manufacturer's part numbers

Commercial Name	Designation of materials	Reference
ADSE650	Ps and Pt Air Data Test Set (0.01% FS)	650-0001
HOSE-PS-10	Red Air Hose Ps (L=10 m)	P6-0126
HOSE-PT-10	Blue Air Hose Pt (L=10m)	P6-0127
CABLE-A-10	Alternative Current Cable (L=10m)	T1-0025
LINK-SERIAL-5	Serial Link Cable (5m)	T1-0110

1.4 Characteristics

Power supply	90 to 240 V AC from 50 to 400 Hz
Normal operating temperature range	-5°C to + 50°C
Storage temperature	-10°C to + 55°C
Overall dimensions of the equipment	Length 339 mm / 13.3 inch Depth 295 mm / 11.6 inch Height 152 mm / 5.9 inch
Outside dimensions of the remote control unit	Width 230 mm / 9 inch Height 140 mm / 5.5 inch Depth 18 mm / 0.7 inch
Total weight (without cables and tubes)	6 kg / 13.2 lbs
Weight of the RCU	0.5 kg / 1.1 lbs
Power consumption	Less than 120 VA ~

1.5 Units, Range and Precision from 10°C to 40°C

1.5.1 Static pressure - Ps

Channel	Unit	Range	Precision	Resolution
Ps	hPa	70 to 1,200 hPa	± 0.1 hPa	0.01 hPa
Ps	InHg	1 to 35 inHg	± 0.0003 inHg	0.001 inHg
Altitude Zp	ft	-2,300 to 60,000 ft	± 3 ft at 0 ft ± 8 ft at 30,000 ft ± 32 ft at 60,000 ft	1 ft
	m	-700 to 18,000 m	± 1 m at 0 m ± 3 m at 10,000 m ± 10 m at 18,000 m	1 m

1.5.2 Total and differential pressures - Pt - ΔP

Channel	Unit	Range	Precision	Resolution
Pt	hPa	70 to 2000 hPa	± 0.15 hPa	0.01 hPa
ΔP	hPa	0 to 1000hPa	± 0.10 hPa	0.01 hPa
Speed Vc	kts	30 to 650 kts	± 2 kt at 50 kts ± 0.14 kt at 500 kts	0.1 kt
	km/h	35 to 1,480	± 3 km/h at 100 km/h ± 0.26 km/h at 900 km/h	0.1 km/h
Mach	M	0.1 to 4.0 M	± 0.0006 M at 0.8 M at 25,000 ft ± 0.0003 M at 1.7 M at 30,000 ft	0.001 M

1.5.3 Ps dynamic variations

Ps channel	Unit	Range	Precision
ΔPs / Δt	hPa / min	10 to 150 hPa / min	±1hPa or ±1 % (1)
ΔZp / Δt (VZ)	ft / min	100 to 6,000 ft / min	±10 ft or ± 1 % (1)
	m / min	30 to 1,800 m / min	±3 m or ± 1 % (1)

1.5.4 Pt dynamic variations

Pt channel	Unit	Range	Precision
ΔPt / Δt	hPa / min	10 to 150 hPa / min	±2 hPa or ± 1 % (1)
Δ Δp / Δt	Δ hPa / min	10 to 150 hPa / min	±2 hPa or ± 1 % (1)
ΔVc / Δt	Kts / min	10 to 200 kts / min	±2 kts or ± 1 % (1)
ΔVc / Δt	Kmh / min	10 to 370 kmh / min	±3.7 km/h or ± 1 % (1)
ΔM / Δt	M / min	0.1 to 1 M / min	±0.01M or ± 1 % (1)

- (1) on an integration time greater than 3 s,
- These performances are valid on a volume of 0 to 1000cc,
- The user can limit all values with "Flight limits".

1.5.5 Rates of intrinsic leak

The intrinsic leak of the ADSE650 on the two channels is maximum 0.7 hPa/min at 500 hPa without outside volume (test time: 15 minutes).

1.6 Technical description

The ADSE650 includes two parts:.

- The Electro-pneumatic Unit,
- The Remote Control Unit.

1.6.1 Electro-pneumatic Unit

1.6.1.1 Front Panel

The front panel of the main box is equipped with:

- One static pressure output,
- One total pressure output,
- One power supply connector,
- Balancing Tap,
- One connector for the remote control unit link,
- Power on visualization and Power on,
- One Wifi Antenna,
- One TabletPC.

1.6.1.2 Electro-pneumatic block

Secured on a chassis below the upper plate, is located the metrological part of the system. The bloc includes the pressure transducers, several electro-valves, the servo-loop gates, the power supply unit and the computer.

1.6.1.3 Pressure transducers

Pressure transducers are of the newest technology ensuring best accuracy.

The pressure sensors result from the last technological developments ensuring a reduction of the costs related to a manufacturing simplification. These sensors easily resist shocks such as overpressure.

The sensors installed in the ADSE650 are guaranteed for uses of operation between 10°C and 40°C with an accuracy of 0.01% of the full scale (with the pressure/temperature software correction).

1.6.1.4 Proportionnal Electrovalves

Two Proportionnal Electrovalves are used on each channel to regulate Pressure and vaccuum

1.6.2 Remote Control Unit

The remote control Unit (RCU) is a commercial Tablet PC located in the cover of the housing with Windows 8 Pro.

The link between RCU and EPU happens through the wifi network.

One cable link can be used to connect the EPU and the RCU with RS232 protocol (Serial Cable Link T1-0110).

1.6.3 Software

1.6.3.1 Language

The EPU computer's Software is written in C langage .

The use of this language ensures the separation of the processing and the permanent control of the various software modules in order to obtain a more stable software base.

The following modules of the software are:

- Sensors management,
- Pressure control management,
- Security management,
- Wifi / RS232 management.

The RCU Software is written in Labview and works under Windows 8.

The following modules of the software are:

- User Interface management,
- Wifi / RS232 management.

1.6.3.2 Pressure control

When the execution of an instruction is required, the starting of the pressure and vacuum pump is activated.

When the current pressure approaches the final set point, control pressure slows down its evolution until the complete stop. This threshold of deceleration is calculated according to the evolution speed and the pressure.

1.6.3.3 Automatic Test programs

All programs are listed in a table accessible through the "Program" menu.
Writing or editing a program: each program step is presented on a separate screen, where the user chooses or modifies the instructions for this step (altitude, speed, evolution to these target values, leak test...)

1.6.3.4 Flight Domain

All information requested to write or edit a flight domain (altitude, rate of climb, speed and acceleration) is presented in one screen, ensuring that keying in the requested data is made very easy.

A table recapitulates all the written domains.

1.6.3.5 Self test

When the equipment gets turned on, an automatic test of the entire bench is performed. If an error is detected, a message is written on the screen and the bench is unusable until the problem is fixed.

2. USER ACCESS

2.1 ADSE650 RCU front panel

1. Charger Cable / Remote control link cable.
2. ON/OFF Tablet Button.

Exhibit 2: ADSE650 remote control front panel

2.2 ADSE650 EPU front panel

1. Remote Control Connector,
2. Wifi Antenna,
3. Charger "USB" for TabletPC
4. Power supply connector,
5. Led charger,
6. "Ps" channel ,
7. Balance Tap (Ps to Pt),
8. "Pt" channel,
9. Vent Tap (Pt to Atmosphere)
10. ON/OFF Button

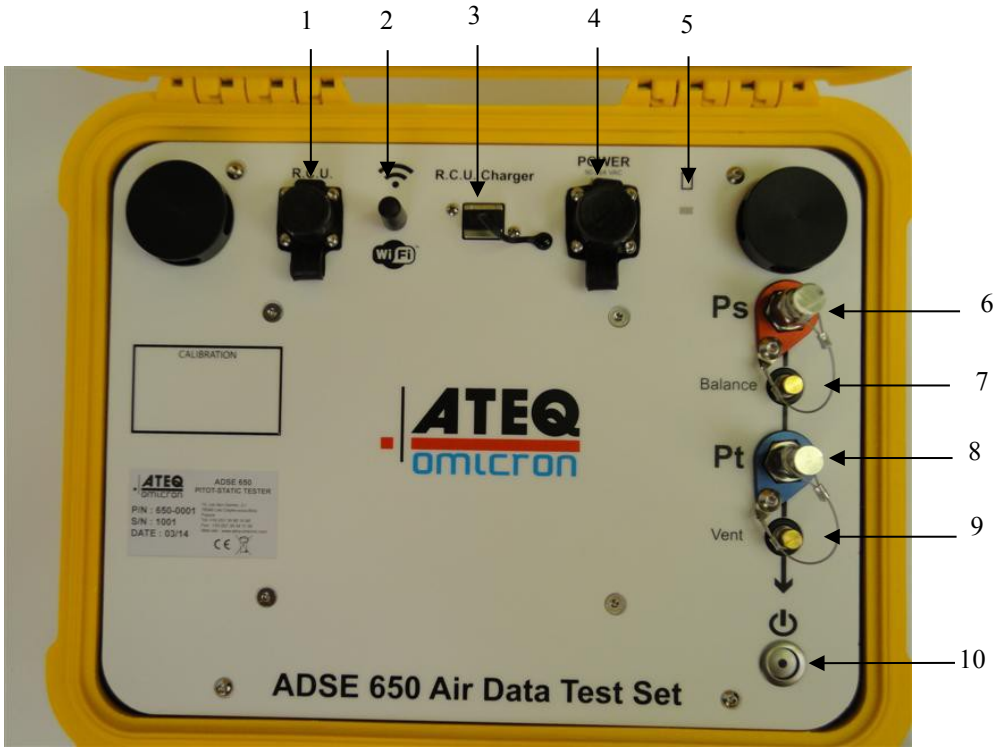


Exhibit 3: ADSE650 main box front panel

3. USE

3.1 Initial Procedure

3.1.1 ADSE650 alternative power feeding

For alternative current (90 to 240 V from 50 to 400 Hz), use the cable T1-0025. Connect the plug to the connector 4 .

3.1.2 Remote control link

In case of Wifi connexion problem, connect the remote control unit with a tool kit cable. Connect one of the ends in the plug on the right side of the remote control unit and the other in the plug marked "RCU" of the front panel of the bench. (Connector 1)

3.1.3 Pneumatic link

Take the hoses with the pneumatic plugs, Red colour for Ps (P4-0126) and Blue colour for Pt (P4-0127). Connect them on the front panel.

Then connect the hoses to the instruments to be tested.

Warning:

- In case of replacement of hoses, use the same kind with the same length.

- During all procedures detailed in the next pages, observe the appropriate safety instructions and procedures stated in local orders and the aircraft and instruments maintenance manuals.

3.1.4 Preparing for use

Check the following:

- Voltage source,
- Electrical connection(s).

3.1.5 Powering up

- Set the momentary On/Off button during 2s on the EPU. The Blue Led blinks during the boot and remains lit.
- Switch on the TabletPC by pressing the ON/OFF button until the Logo "Dell" appears.

3.1.6 Interface software

On the power up, the TabletPC boot on Windows 8, run the program "ADSE" by clicking on the shortcut on the desk.

3.1.7 Shutting off

- Set the momentary On/Off button on the EPU during 2s.
- Switch off the TabletPC by pressing the ON/OFF button during 1 to 5s and follow the instruction on the Tablet to shut down the PC.

NB: To avoid to discharge the TabletPC quickly, shut down the PC as describe and avoid to stay in sleep mode.

3.2 Using the operator interface

3.2.1 Starting software

When the software gets started, the above screen is displayed as long as the computer is running its self test and the connection between the servo control computer and the user interface computer is not established.

By pressing "Cancel Connection", the operator can interrupt the connection process. The computer will then go to "Disconnected Mode" and will not try to connect again.

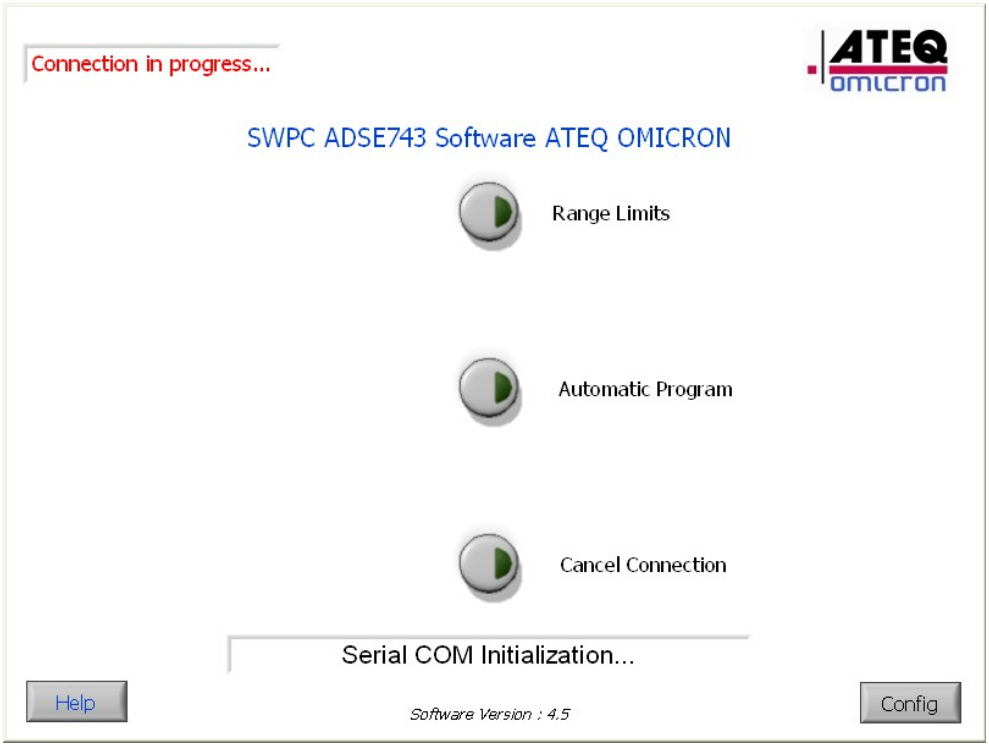


Exhibit 4

3.2.1.1 Connection established

As soon as the connection is established, the information "Connected Mode" appears. All keys on the screen become accessible to the user.

If the self test has been completed without problem, no message appears in the information area situated at the bottom of the screen.

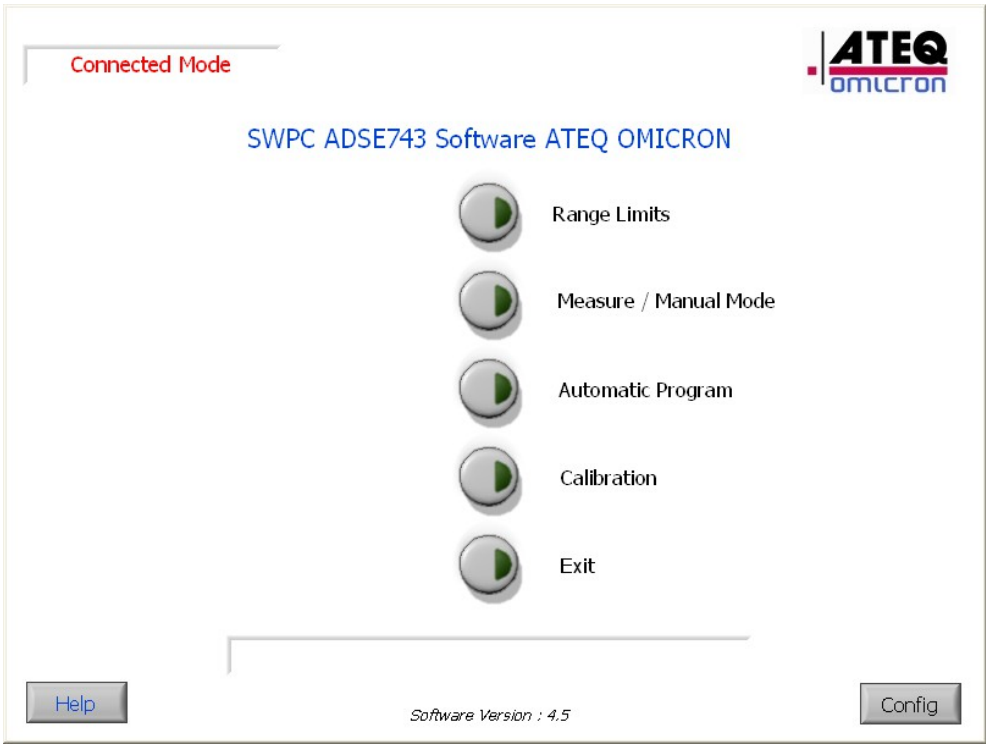


Exhibit 5

- Range limits: To select, create or modify domains,
- Measure / Manual Mode: To use ASDE in manual mode,
- Automatic Program: To select, create, modify and execute automatic program,
- Calibration : To calibrate transducer Ps and Pt,
- Exit: To Exit from application and come back to Windows.

Note: The date of the last calibration is indicate on the bottom field text.

3.2.1.2 Connection not established

If the computer could not complete its self test, the connection with the user interface computer does not happen. The message "Mode not connected" appears.

To retry the connection:

- Check, if at the power up of windows, in the taskbar of windows 8, the icone “Wifi limited” appears.

- Check if the Wifi network is available and correct on the Tablet, (SSID=OMI650XXXX, XXXX= serial number of ADSE)
- Check the parameters of your Tablet (§3.2.6 General Information)
- Exit from the application
- restart the Pneumatic unit and waiting for the wifi connection on the Tablet
- and re-launch “ADSE” on the Tablet.

If the problem persists, contact the after sales service of *ATEQ*.

3.2.2 Access to the flight domains

Press "Range limits" to access this menu. It gives access to following functions:

- Select an existing flight domain,
- Create a new flight domain,
- Edit an existing flight domain.

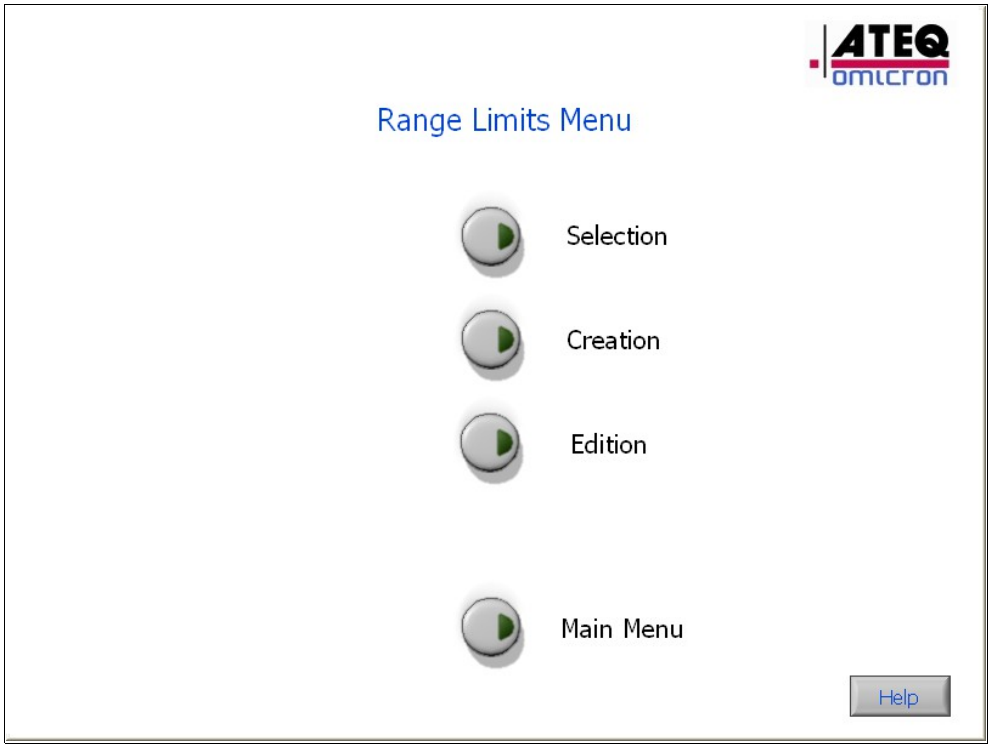


Exhibit 6

3.2.2.1 Select a flight domain.

The selection of a flight domain happens through a window presenting all existing flight domains.

- Press "Cancel" to come back to the "Range limits" main menu,
- Select the desired Domains,
- Press "Validate" to visualize the selected flight domain.

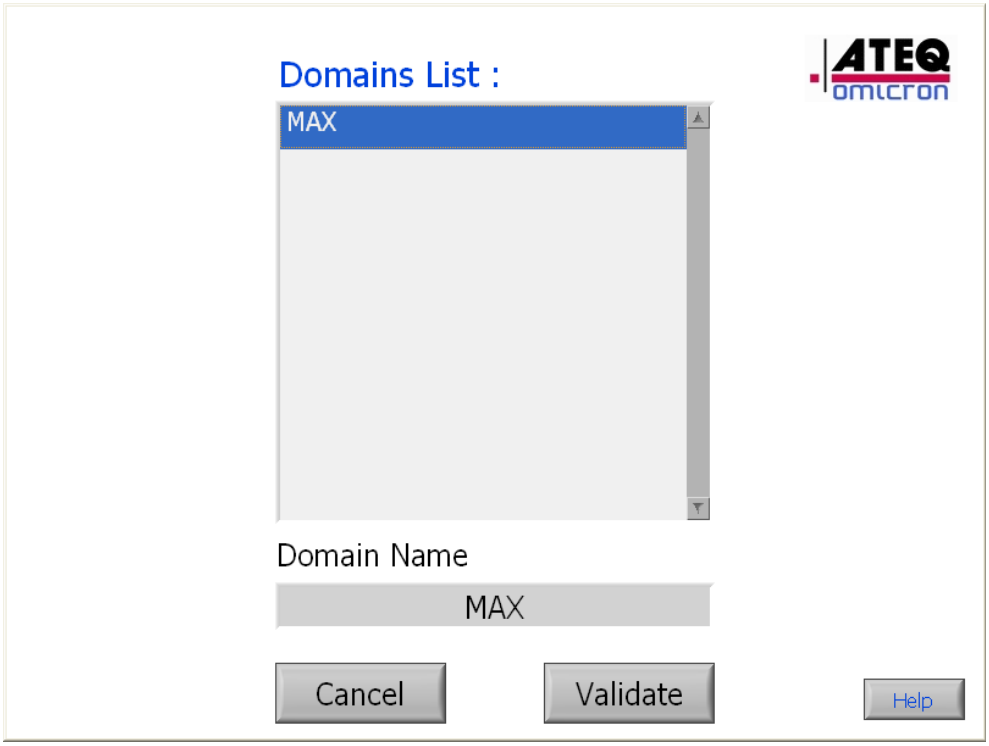


Exhibit 7

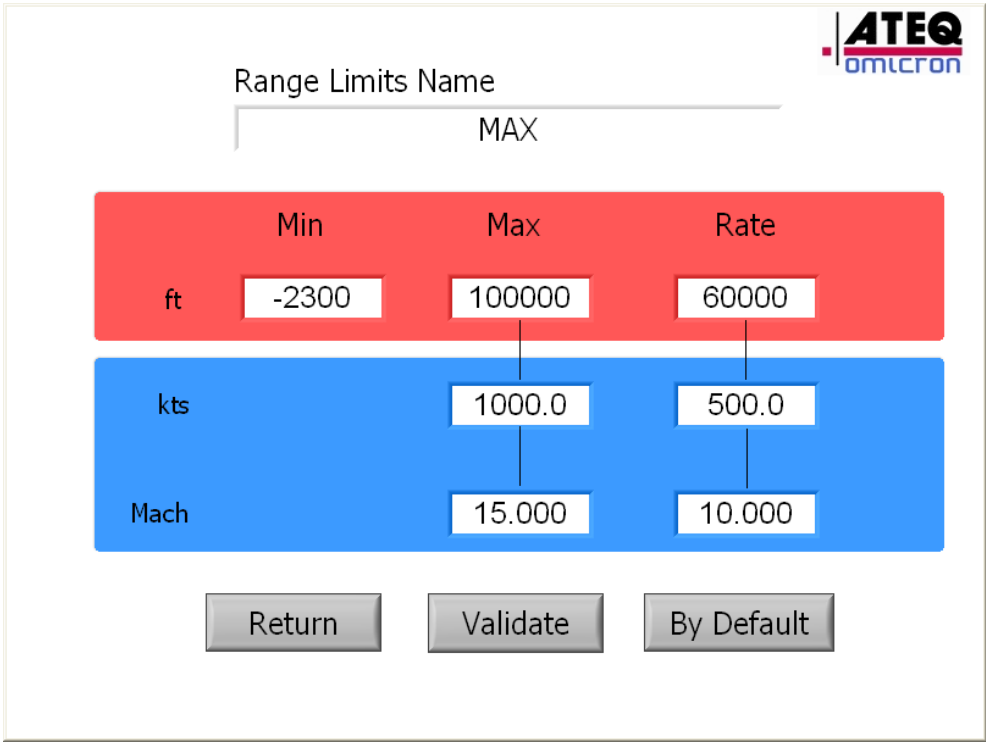


Exhibit 8

All parameters of this flight domain appear, the user can choose between:

- "Return" to return to the list of flight domains,
- "Validate" to select this flight domain immediately (but this selection will be lost at the next start of the software),
- "By Default" to select this flight domain immediately and keep it as domain by default at the start of the system.

Note: The flight domain called "MAX" is a reserved flight domain and can neither be modified nor deleted.

3.2.2.2 Creating a flight domain

The range limits creating mode is accessible through a password.

Upon creation of a flight domain, the value fields are pre-programmed with the maximum values acceptable by your ADSE650.

The user must:

- Enter a domain name by clicking on the field, which gives access to an alphanumeric keyboard,
- Modify the values by using the digital keyboard which appears by clicking on the associated field.

Once all parameters are entered, press "Save" to validate and record the data or press "Return" to abandon the flight domain creation and come back to the "Range limits" main menu.

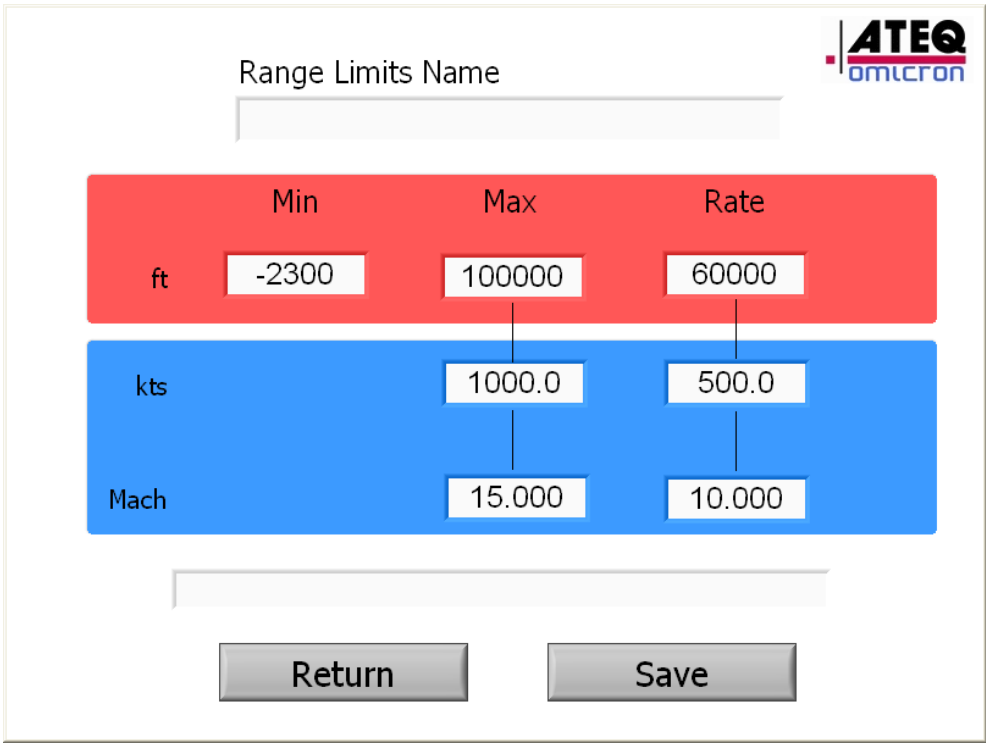


Exhibit 9

3.2.2.3 Editing, Renaming and deleting a flight domain

The range limits editing mode is accessible through a password.

Editing a flight domain happens through a window presenting all existing flight domains (except "MAX").

- Rename domain by clicking on the field, which gives access to an alphanumeric keyboard,
- "Return" to come back to the "Range limits" main menu,
- "Validate" to edit the selected flight domain.

All parameters of this flight domain appear; the user can modify the values by using the digital keyboard which appears by clicking on the associated field.

After entering the data, press

- "Return" to come back to the "Range limits" main menu,
- "Save" to record the selected flight domain.

Note:
You can erase a domain file when you edit it. For this, you can use the "Delete" button (you must confirm your choice).

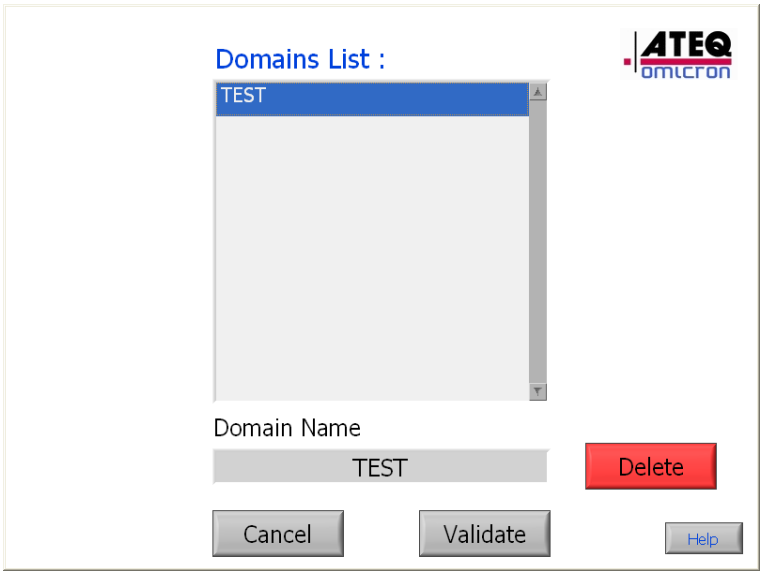


Exhibit 10

3.2.3 Access to the Measure/Manual Mode

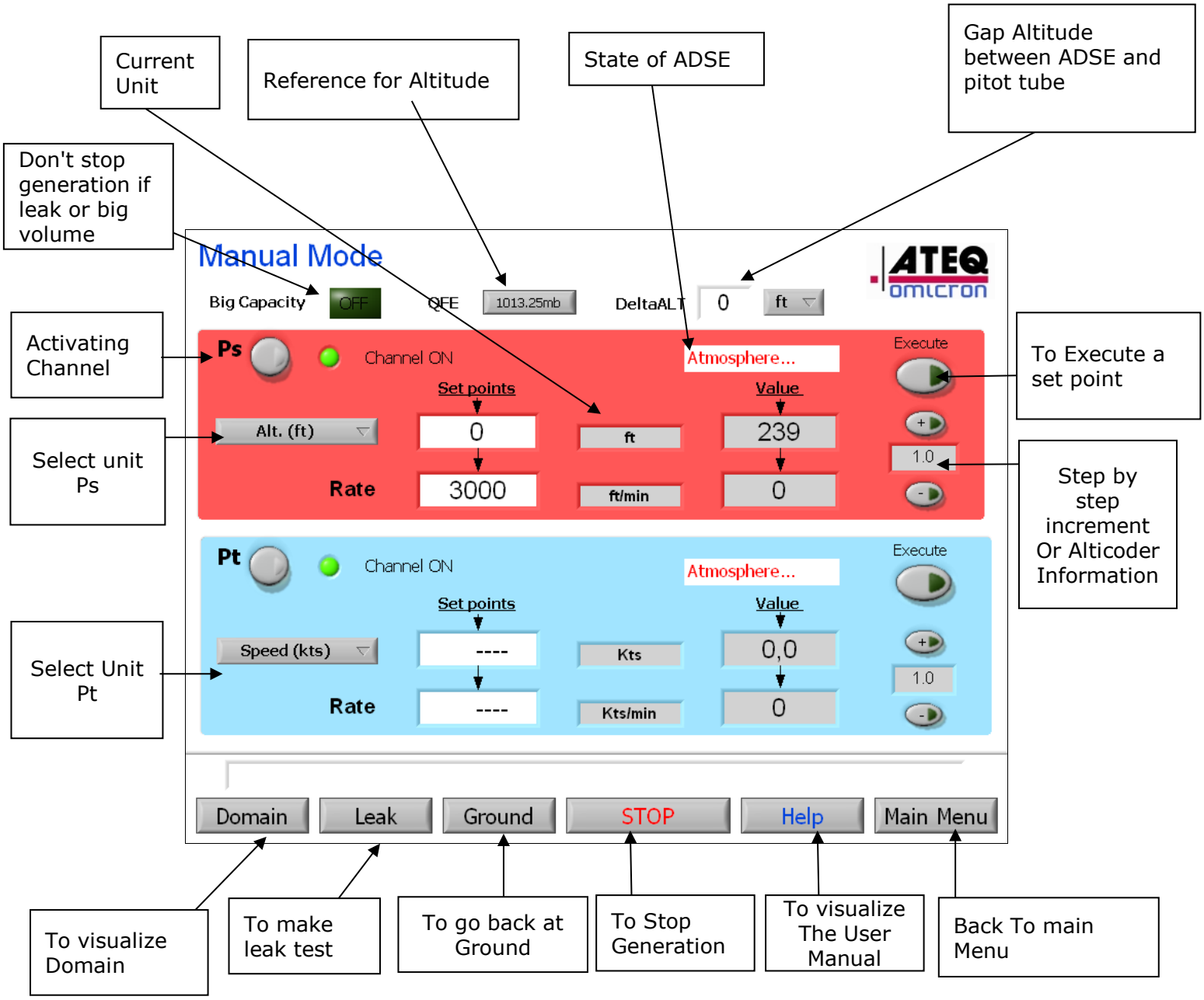


Exhibit 11

In this Mode, the operator can access to:

- Manual Mode: Access to the unit, pressure information, generation mode,
- Leak test: To run Leak test on Ps and Pt,
- Domain: To view the current domain,
- Help: To view the Help in line.

On each channel (Ps and Pt), the user can:

- Change the pressure unit with the scrolling menu,
- Enabling or disabling the channel, in order to access the instruction fields for a generation, a leak test...,
- Enter the generation instructions,
- Launch a generation,
- Increment the value step by step in the selected unit,
- Move to the Leak test function,
- Come back to the ground,
- Stop a generation.

Note:
Mode Big Capacity: This mode is used when you have a big volume and the rate of climb is not an important parameter. In this case, the ADSE regulate with the desired rate of climb if the volume is too big, or if there is an important leak, the tester will keep generating at a lower rate of climb. In the standard case, the ADSE stop generation if one parameter can not be respect.

In this mode, you have not messages on the ADSE limits (example with Ps channel : "Ps : Limits Exceeded").

3.2.3.1 Changing the unit on the Ps and Pt

To change the unit, press the "Alt." button (for the Ps channel) or "Speed" button (for the Pt channel) and select the unit from the scrolling list.

The change is active when the requested unit appears in the field "Actual unit". The pressure evolution is then displayed in the new selected unit.

Important notice: a unit change does not result in an update of the target and rates values, due to the non linearity between pressure units on one side and altitude and speed units on the other side.

- Unit Ps: hPa, Psi, mmHg, inHg, ft, m...

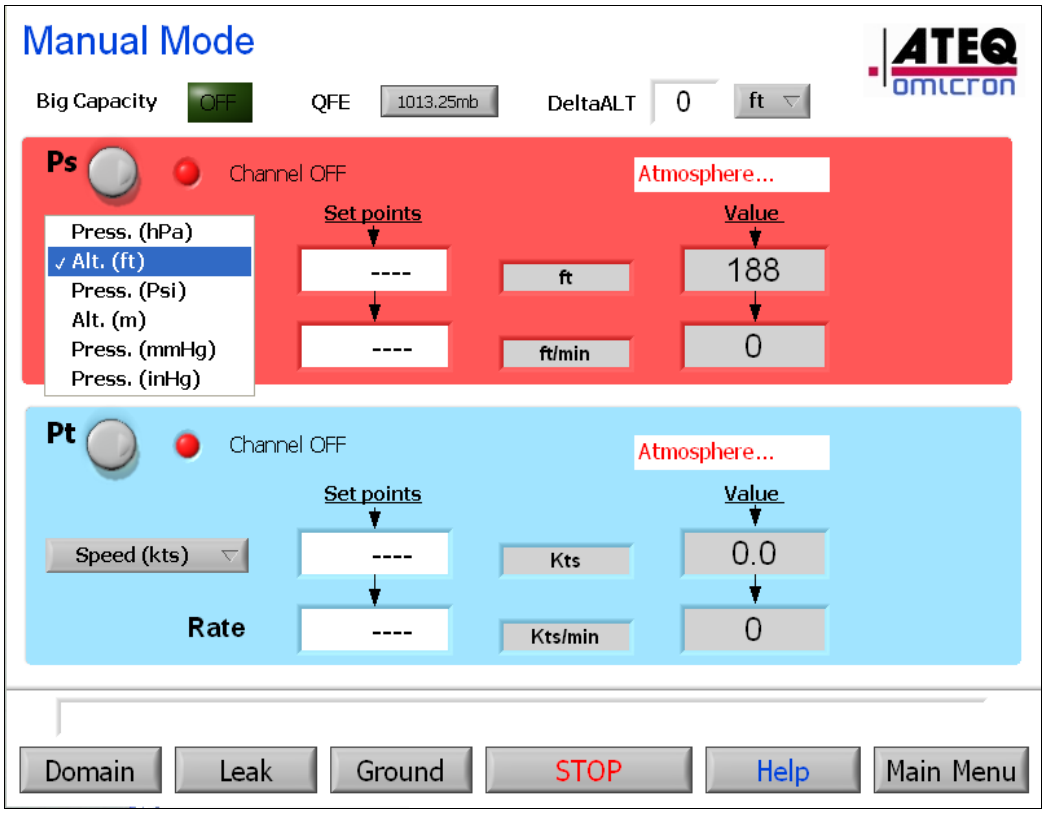


Exhibit 12

- Unit Pt: hPa, Psi, mmHg, inHg, DhPa, DPsi, DmmHg, DinHg, Kts, km/h, MPH, Mach...

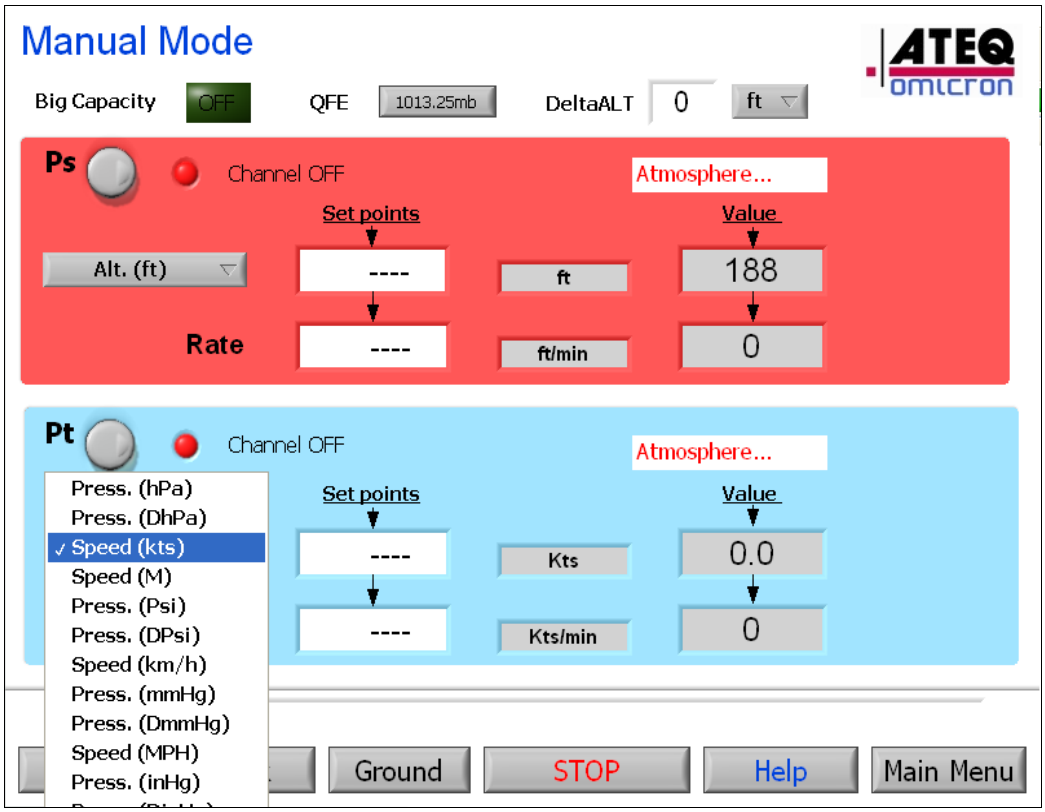


Exhibit 13

Note: If the focus stays on the Units button more of five seconds (see: software parameter), an Unit Window opens. With it, you can select units more easily.

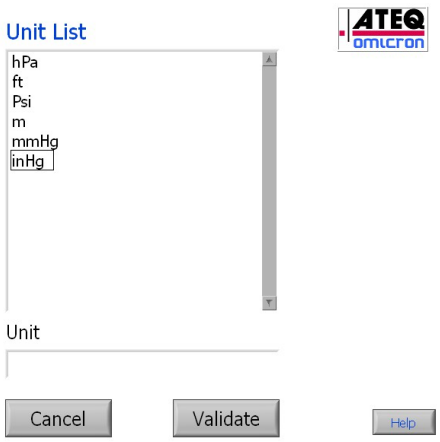


Exhibit 14

3.2.3.2 Activating a channel

Enabled or disabled a channel happens by clicking on the "Ps" or "Pt" button. A green or red light and a message indicate the status of the channel:

- If the channel is active, the light is green and the message displayed is "Channel ON".
- If the channel is inactive, the light is red and the message displayed is "Channel OFF".

Activating a channel gives access to the instruction fields and to the "Execute", "Leak" and "Ground" functions.

When a channel is inactive and will not be used during a generation, it is recommended to leave the corresponding outlet open, in order to keep the internal pressure of this channel equal to the ambient pressure.

Warning: The function of generating on Ps and leaving the Pt channel inactive should be used with major care, especially when the static circuit of the aircraft is pneumatically linked to the airspeed indicator: generating on Ps will cause the airspeed indicator to climb, potentially outside its range limits.

3.2.3.3 Generating on the Ps or Pt channel

To perform a generation,

- Active the channel,
- Select the desired unit
- Enter the altitude (for Ps) or speed (for Pt) value and the climb rate (Ps) or acceleration (Pt):
  - Select the instruction field. This field will flicker in red.
  - Enter the desired value with the keyboard. Repeat this operation with the "Rate" field.

If one of the values entered is outside the flight domain, a message "Domain overflow" will appear at the bottom of the screen and the value will be forced to the

closest value within the flight domain (either min or max value within the flight domain, depending whether the entered value was below or over the allowable values).

Executing the instruction:

In order to execute the instruction, click on "Execute". The data entered in the instruction fields of the active channels are taken into account and the ADSE650 starts generating.

Different messages appear during the different phases of the generation.

- Before the generation starts, the message indicates "Measure": the ADSE is in slave mode and displays the pressure without controlling it.
- When the generation starts, the ADSE will manage the evolution of the pressure. During the first phase, the tester will start the pumps (message displayed: "Starting"), then balance the pressure internally to avoid a pressure surge (Message displayed: "Balancing").
- During the next phase, the pressure will evolve at the set rate to reach the set target. The message displayed indicates "Run".
- During the last phase, the pressure is stabilized at the set target. The message displayed indicates "Ready".

Note #1: In execution mode, the automatic increment of the target is accessible. By using this function, the operator can increment or decrement the target pressure by the value indicated between the "+" and "-" buttons. By clicking the "+" or "-" button, the operator increases or decreases the target value. The ADSE650 updates the display of the instructions accordingly and starts generating the pressure according to this new target. To modify the increment step, click on the corresponding field and enter the requested value with the keyboard.

Note #2: If you change an instruction during the generation, click on "Execute" to request the generator to take this new value into account.

Note #3: When both channels are active, clicking on "Execute" requests the generation on both channels simultaneously. In this case, the generation starts first on the Pt channel. When the rate is stabilized on Pt, the generation starts on Ps.

Note #4: If the operator clicks "Execute" without having entered a value in the "Rate" field, the system will display the message "Domain overflow" and force the rate to the minimum value.

3.2.3.4 Leak test

When the operator switches to the Leak test mode, the ADSE moves automatically to the "Measure" mode on both channels. The unit for the leak test is the unit selected in the main menu of the manual mode.

To access this screen, click on the "LEAK" button of the manual mode menu.

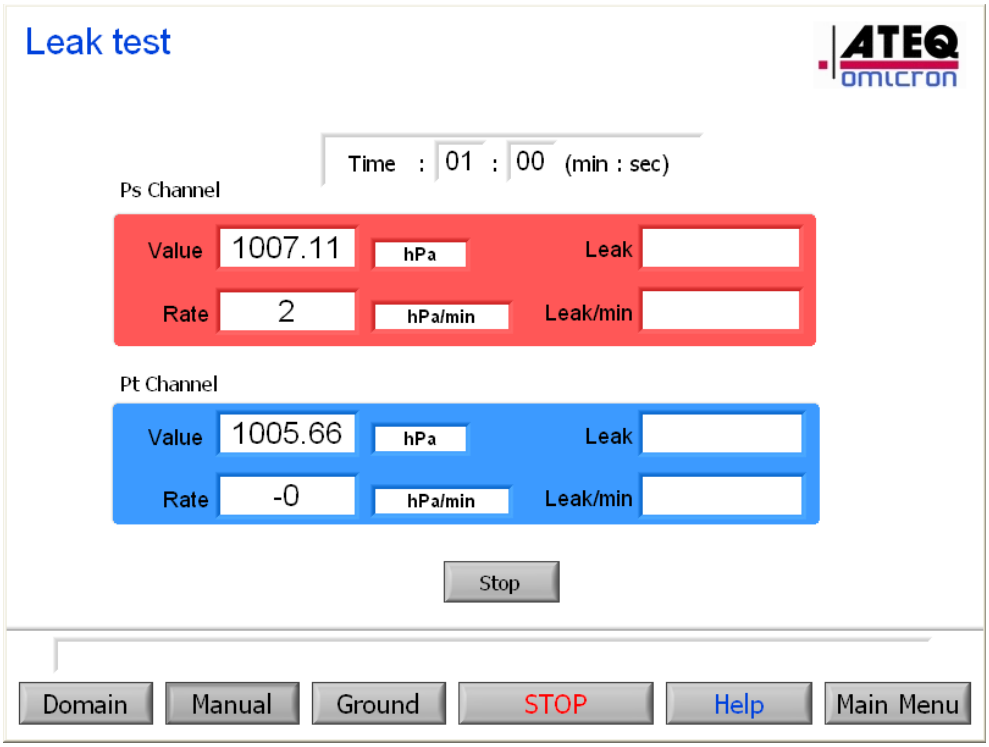


Exhibit 15

To configure the test, enter a time. Click on the minutes and seconds field and enter the values with the keyboard.

To launch the leak test, click on "Start". The time starts being counted down until 0 minute and 0 second. The leak is displayed in the "Leak" field. In "Leak/min", you find the leak for one minute.

During the test, the fields "Value" and "Rate" evolve. The operator can stop the leak test at any time by clicking on the "Stop" button.

To come back to the main screen of the manual mode, click on the "MANUAL" button. The ADSE650 returns to the generation mode.

Important notice: if a unit change has been performed, the set targets might be inconsistent with the units. Recheck carefully the set values before starting a generation.

Note:

- For pressure unit (hPa, Psi ...):

  Result=Final Pressure – Initial Pressure

- For altitude and airspeed unit (ft, m, kts, Mach...):

  Result=Initial value – Final Value

3.2.3.5 *Return to the ground*

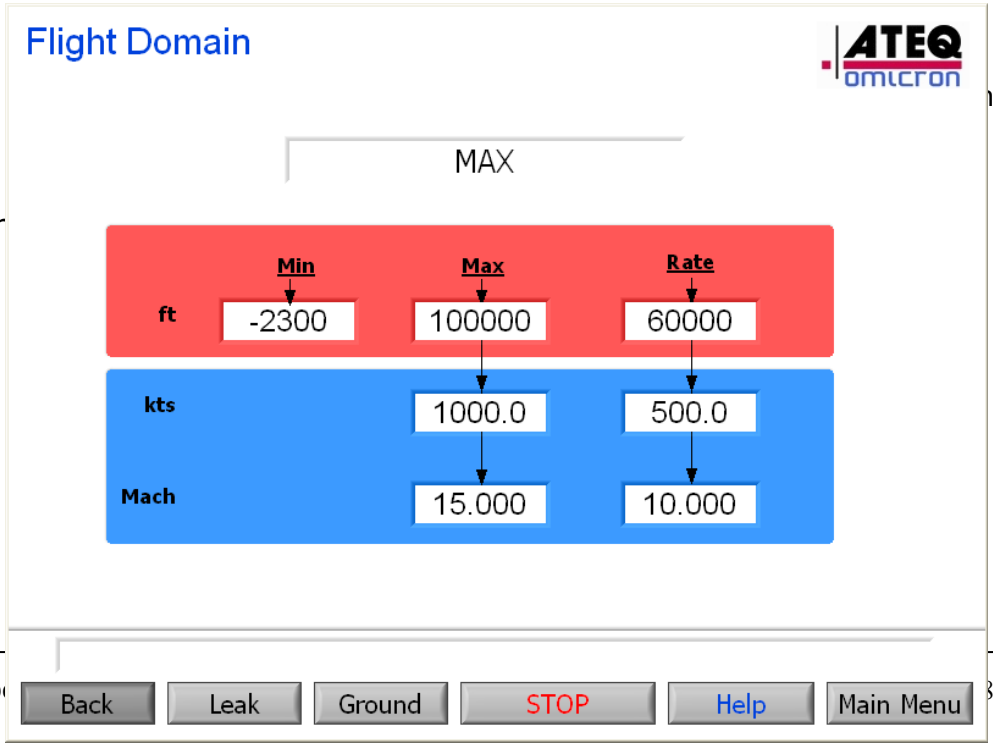
When the operator clicks on "Ground", the ADSE650 compares the ambient pressure with the pressures in the Ps and Pt circuits. If on one of the channels, the pressure is different, the ADSE650 turns to the generator mode and returns to the atmospheric pressure in the selected unit and using the last rate entered. The message "Back to Ground" is displayed at the bottom of the screen

Once the internal pressure has reached the ambient pressure, the ADSE turns to the "Measure" mode and opens the internal circuit to the ambient pressure. The message "Atmosphere" is displayed at the bottom of the screen. The equipment in test can be securely disconnected from the ADSE650.

Note: When the system is back to ground ("Atmosphere" displayed on both channels) the operator has access to:

- The correction of Qfe: Choice between 1013.25 hPa and atmospheric (local) pressure as reference for altitude simulation.
- The correction for altitude gap: Parameter in feet or meter equal to the difference between the measurement of the pressure at the level of the test set (Ps outlet) and the altimeter situated in the aircraft.

3.2.3.6 *Displaying the current flight domain*



At any ...e flight domain

To retur...

3.2.4 Automatic program mode

The program mode allows the user to create, visualize, edit and start an automatic test program.

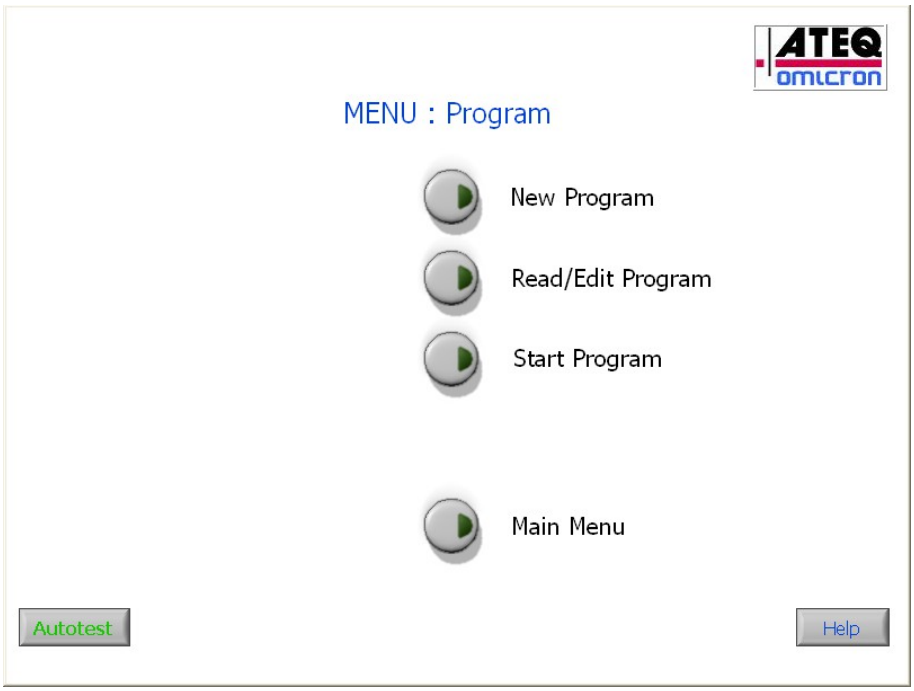


Exhibit 17

Note : See "Autotest" section in "Maintenance" chapter to use the "Autotest" button.

3.2.4.1 Writing a new program

The program writing mode is accessible through a password.

Steps for writing a flight program:

- Click on "New Program". This gives access to the screen shown,

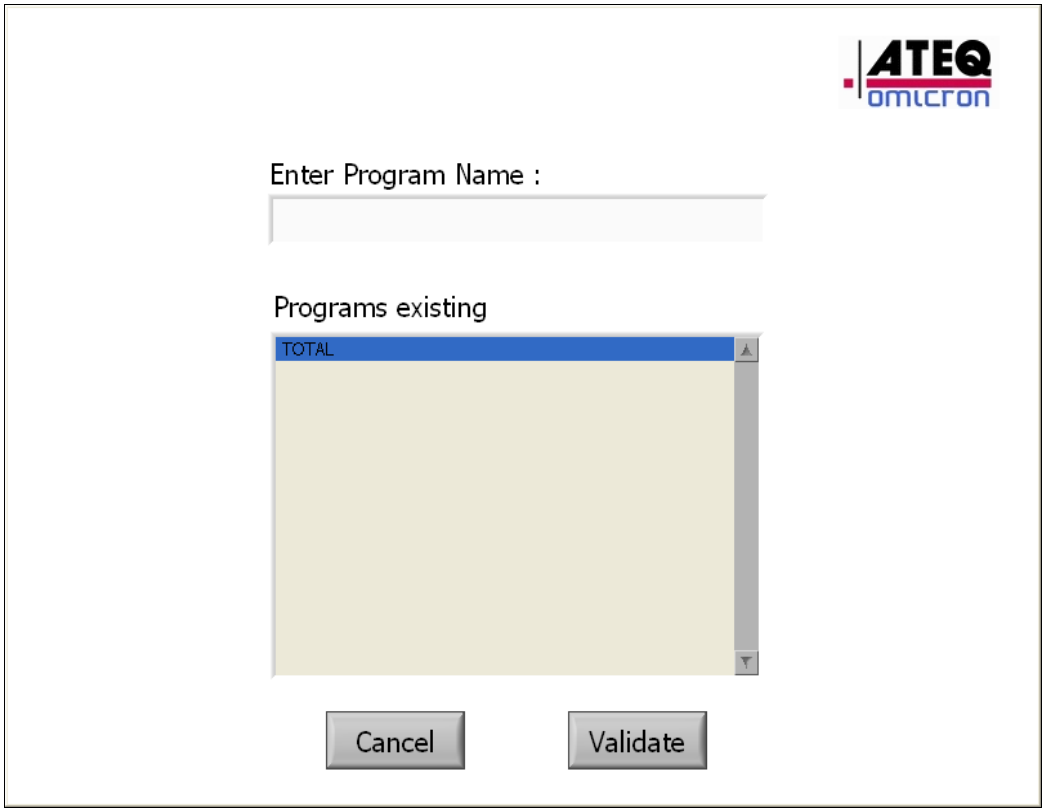


Exhibit 18

- Enter a file name by clicking on the field, in order to have access to the alphanumerical keyboard. The list of existing files is given for information. When the "Validate" button is clicked, a consistency check is performed.
  - If the field is empty, the application returns to the main menu
  - If the program name already exists, a connection box is displayed, indicating the problem. After validation, the user is requested to enter a new name.

- Write a program with a maximum of 40 steps
- To save the data, click on "Save",
- To delete a current program step, click on "Delete (Step)",
- To insert a step before the step displayed, click on "Insert (Step)",
- To Add a step click on "→",
- To cancel the creation of the program, click on "Main Menu".

- **"Measure" Mode:** The ADSE650 switches to the pressure measure mode and stops regulating the pressure. In this mode, the measurement unit can be chosen, in which the information shall be displayed, as well as the level time before the program goes to the next step.

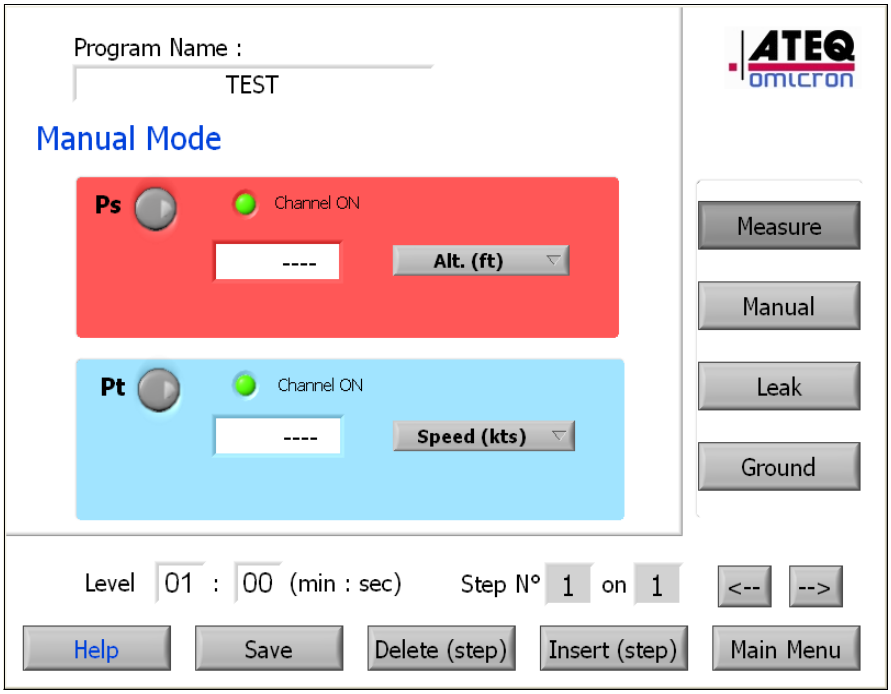


Exhibit 19

- **"Generation" Mode**: In this mode, the altitude or speed value, the climb or acceleration rate and the measurement unit used for the generation need to be entered. Once the generation level has been reached, the level time entered by the user is counted down before the program goes to the next step.

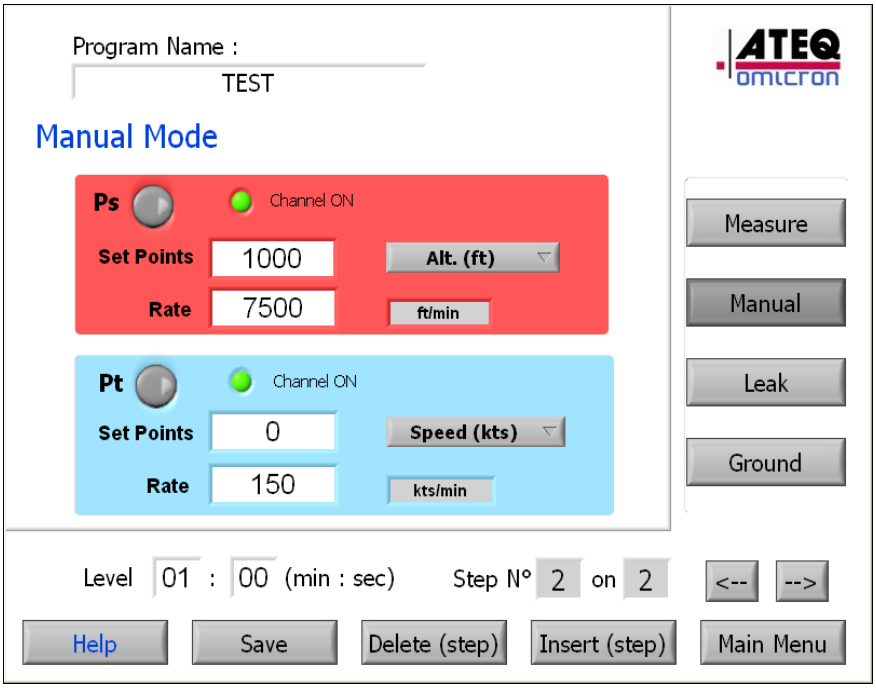


Exhibit 20

- **"Leak" Mode**: In this mode, the ADSE650 switches into measure mode, waits until the pressure stabilizes in the circuit during a time corresponding to the level entered by the user, then starts the leak test entered in the "Time" field and in the entered measurement unit. Once the time has been counted down, the user is requested to validate, so that the program continues to the next step.

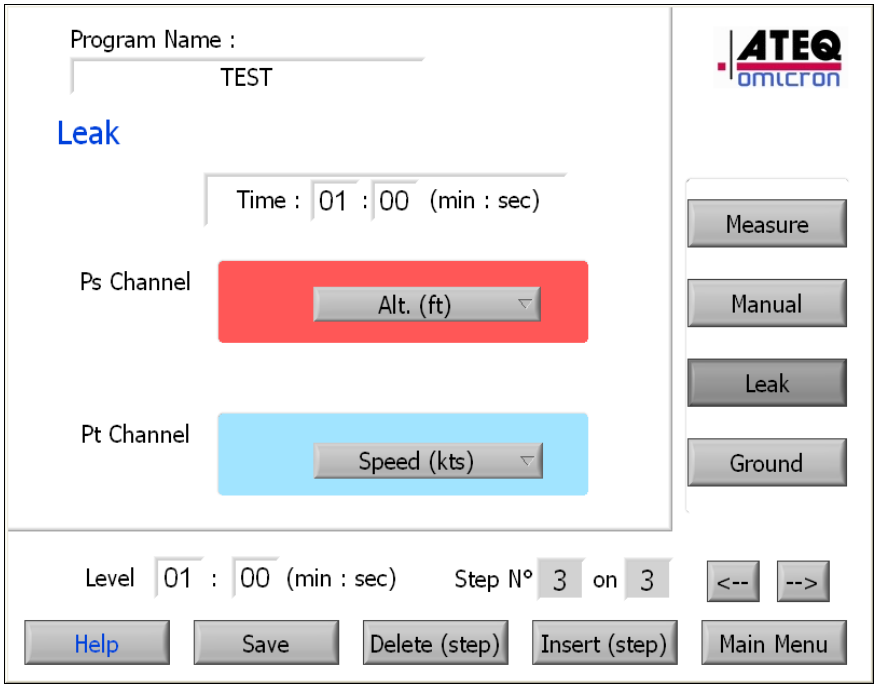


Exhibit 21

- **"Ground" Mode**: The ADSE650 automatically comes back to the ground, using the last measurement unit and the last rate of climb validated, and then opens the electro-valve putting the circuit at atmospheric pressure. If the generator is already at atmospheric pressure (+/- 5 hPa), only the electro-valve opening to the atmospheric pressure is activated. Once the ADSE650 has reached the atmospheric pressure, the level time entered by the user is counted down before the program goes to the next step.

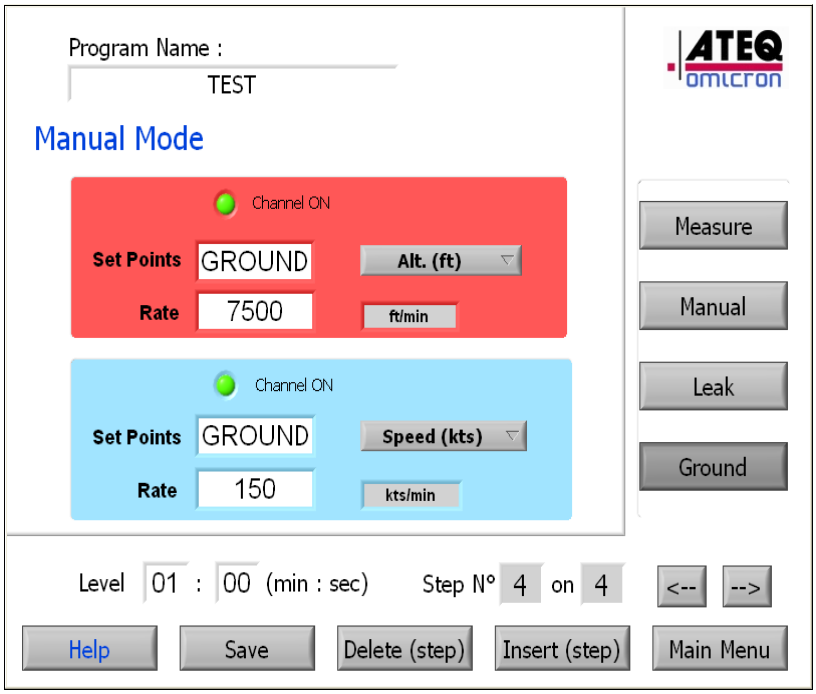


Exhibit 22

Note: In the case of a request to return to ground, when no generation has been performed before but the generator is at a pressure different from the atmospheric pressure, the equipment comes back to the ground using the hPa as measurement unit and a climb rate equal to 100 hPa/min.

3.2.4.2 *Editing, Renaming and deleting a program file*

- Click on "Read/Edit Program" on the Automatic Program menu (Exhibit 17),
- Select the desired program,

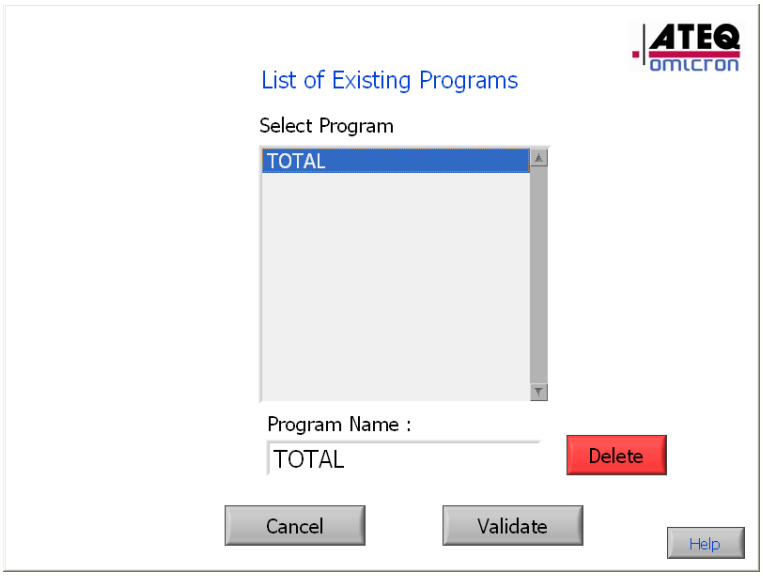


Exhibit 23

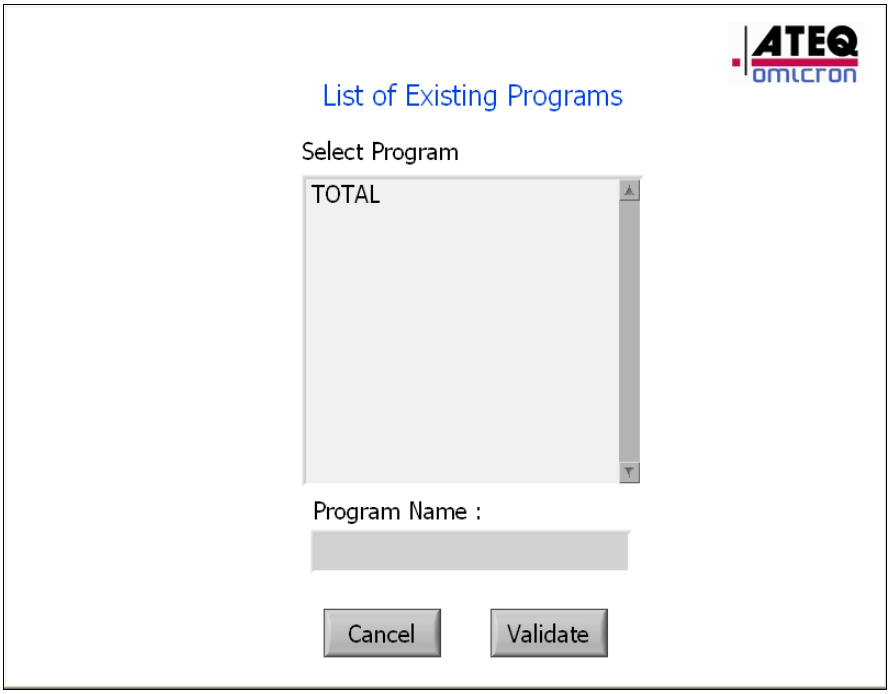
- The screens displayed are identical to the screens of the creation mode. The user can edit the program, delete or modify existing steps or add new steps.
- To save the modifications, click on "Save", and enter the right password.
- To quit without saving, click on "Menu".

Note: You can erase a program file when you edit it. For this, you can use the "Delete" button. You must confirm your choice.

3.2.4.3 Executing a program

<u>Important Notice:</u> Before starting a program, it is recommended to make sure that the test set is at ground level:

- Select "Measure/Manual Mode" in the main menu:
- Return the system back to the ground ("Atmosphere" displayed on both channels),



<u>Exhibit 24</u>

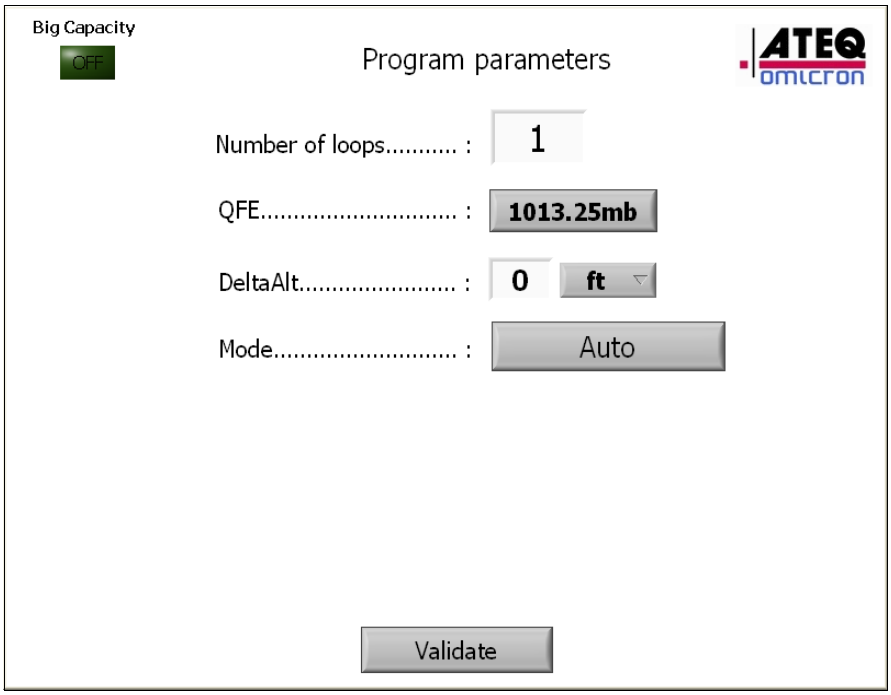


Exhibit 25

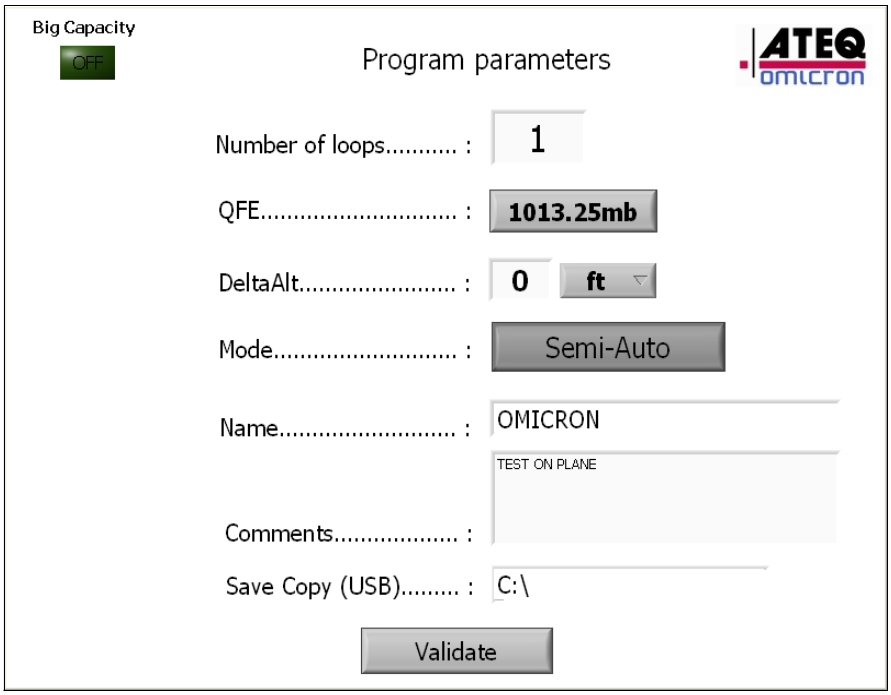


Exhibit 26

Note: You can select "Big Capacity" mode before to start program.

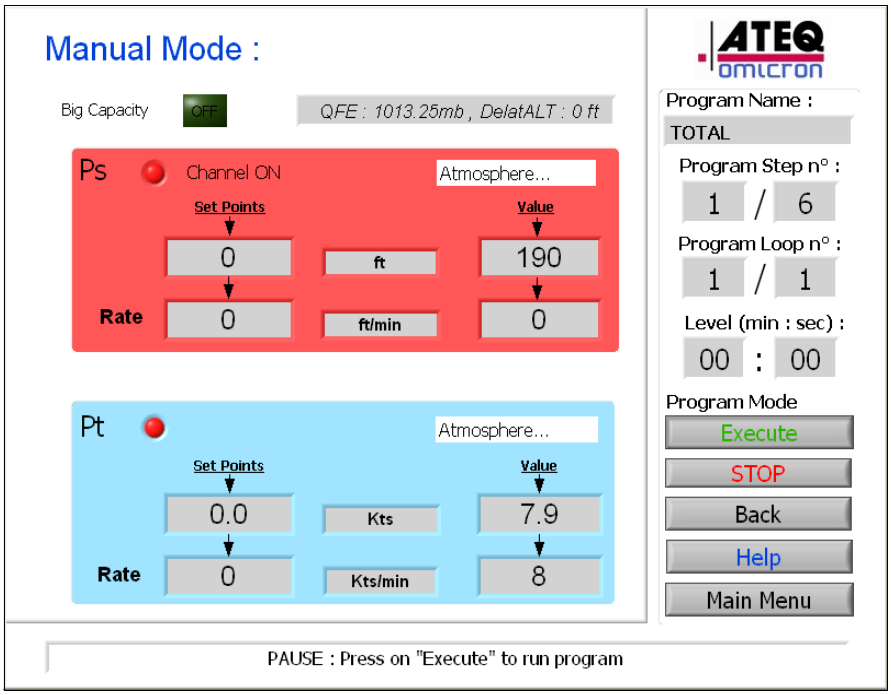


Exhibit 27

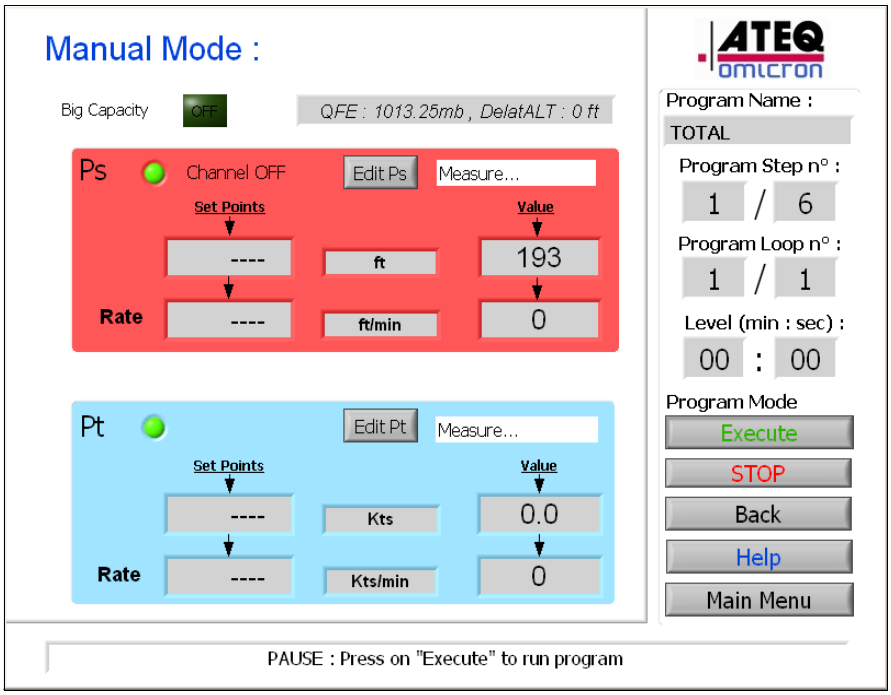


Exhibit 28

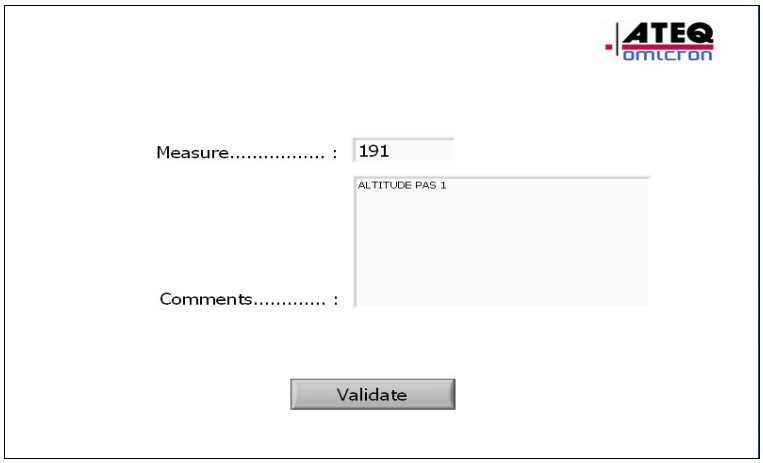


Exhibit 29

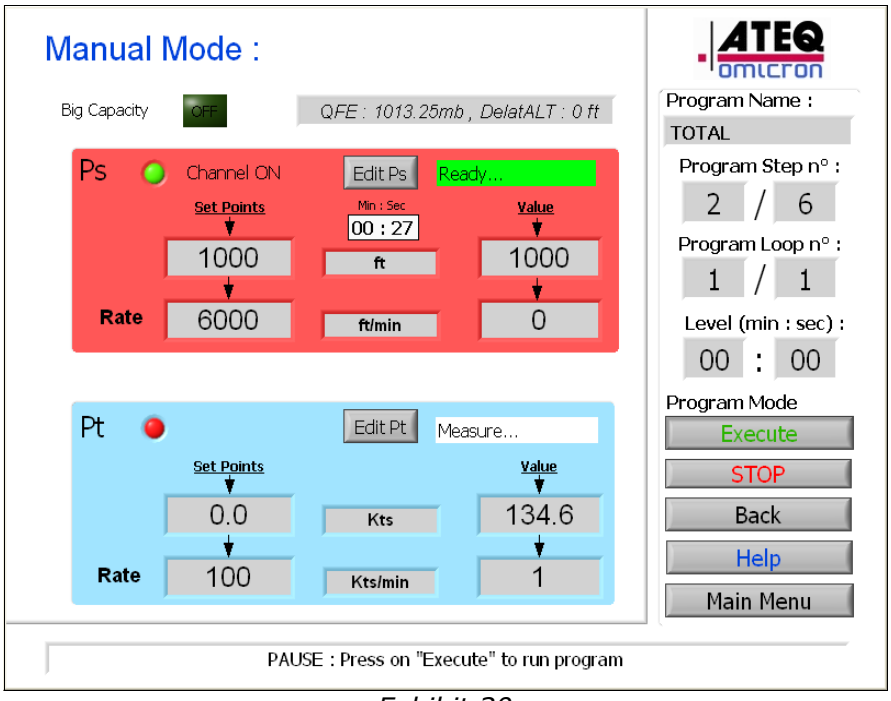


Exhibit 30

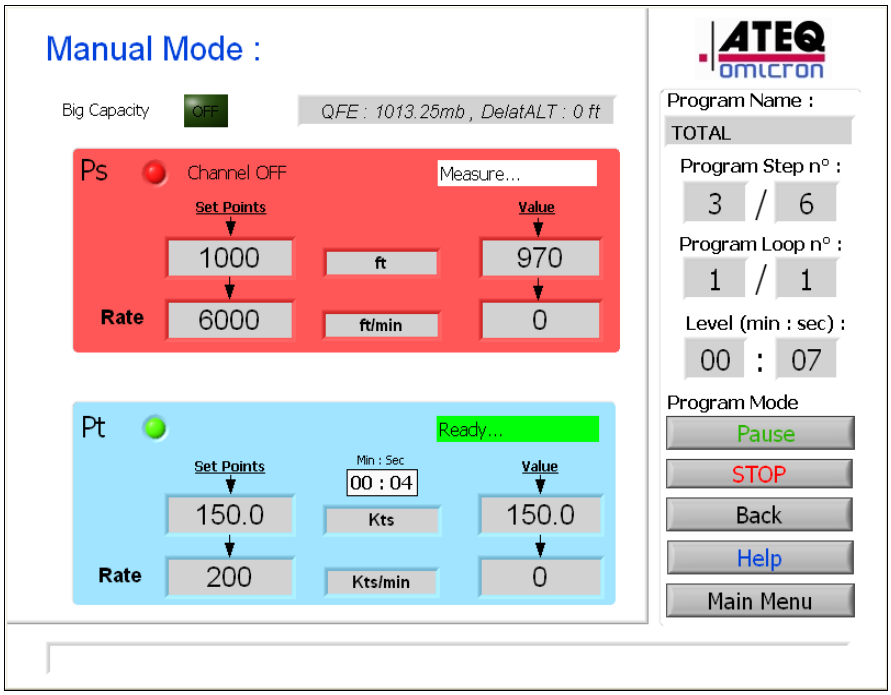


Exhibit 31

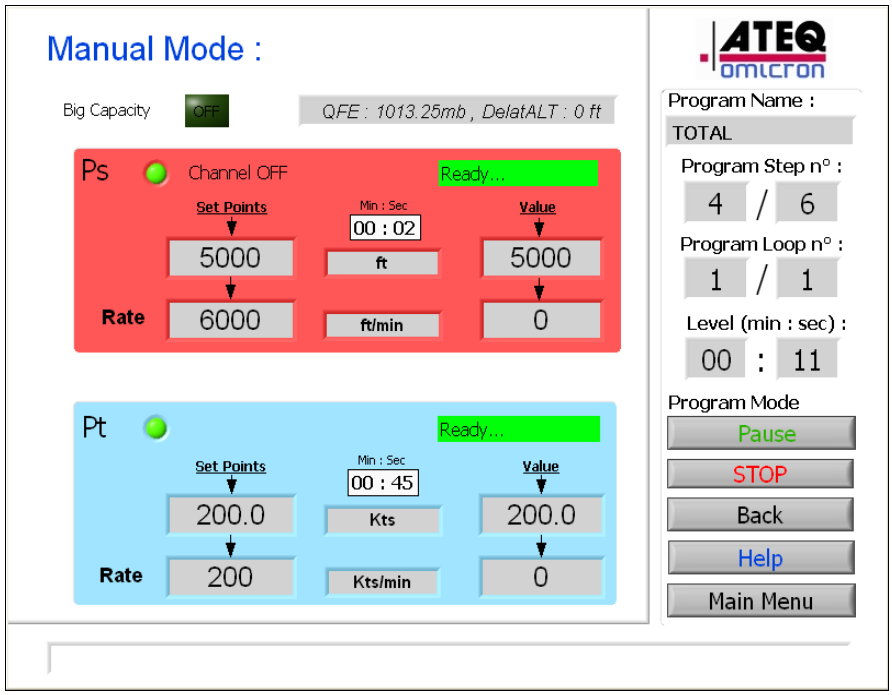


Exhibit 32

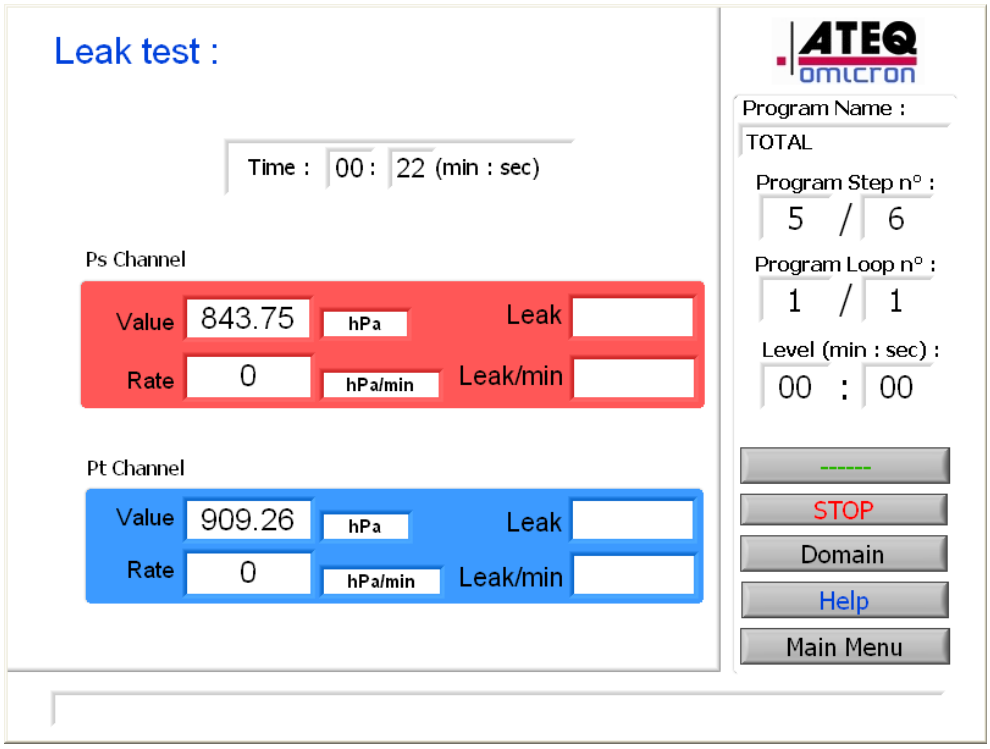


Exhibit 33

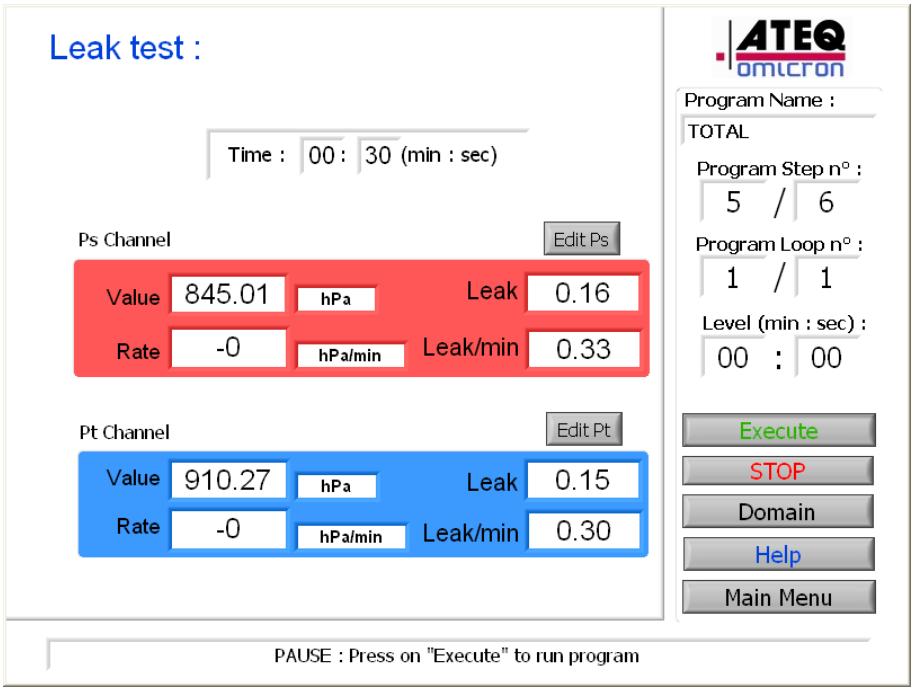


Exhibit 34

Exhibit 35

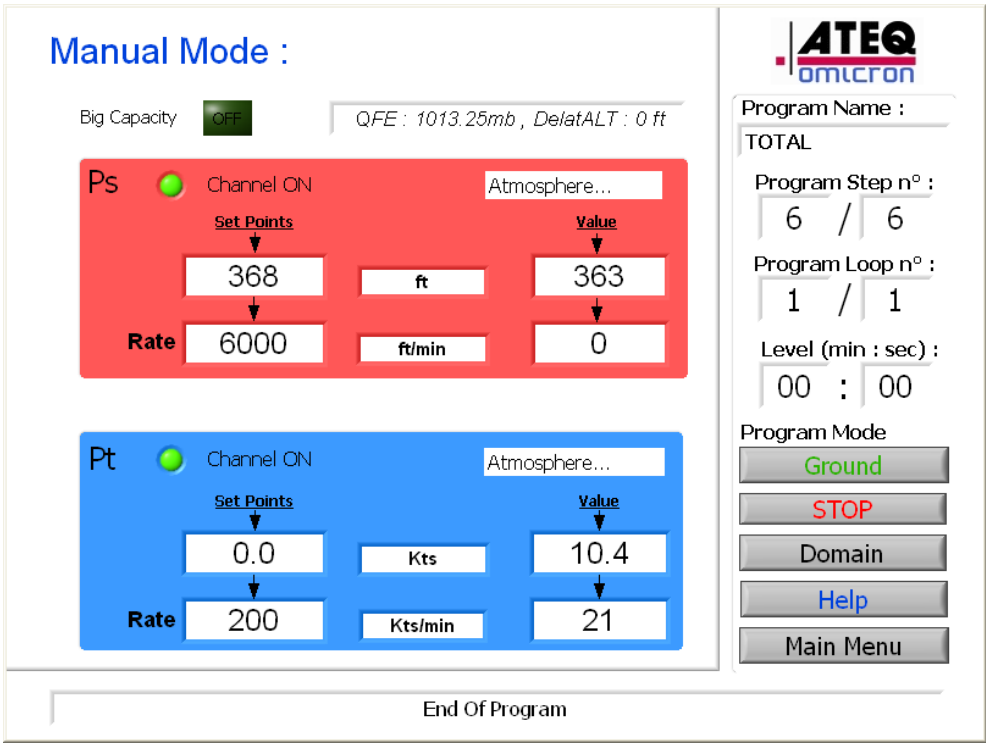


Exhibit 36

3.2.4.3.1 Operating Mode

- Click on "Start Program" (Exhibit 17) to access screen shown on Exhibit 24
- Select a test program in the list of existing programs and "Validate",
- A configuration window (Exhibit 25) appears to:
    - Enter a number of loops (number of times you want the program to repeat).
    - Select the pressure reference (Choice between 1013.25 hPa and local (Qfe) pressure).
    - Enter the altitude gap between the test set (Ps outlet) and the altimeter situated in the aircraft. For example, if the altimeter is 10 feet above the test set, enter "10". If it is 10 feet below the test set, enter "-10".
    - Select automatic (Exhibit 25) or semi automatic (Exhibit 26) program. In semi automatic mode, the test set pauses after each program step. The operator can enter the values read on the instruments as well as comments, separately for the Ps and the Pt channels. These data (value and comments) is saved in a spreadsheet (see next paragraph).
- Validate to start program.
- The step #1/x is displayed with the program Loop #1/y and the name of the selected program (Exhibit 27).
- Click on "Execute" to start the program.
- The step #1 of the loop #1 is displayed and executed and so forth until step #x/x and Loop #y/y for the automatic mode.

- Note #1: In semi automatic mode, at the end of each step, two buttons "Edit Ps" and "Edit Pt" appear (Exhibit 28) to enter the value shown on the altimeter and/or airspeed indicator and comments (Exhibit 29). To resume the program, press "Execute".

- Note #2: At any time, the user can switch to the standby mode by clicking on "Pause". If the generator is counting down a level time, the "Pause" instruction will be taken into account at the end of the countdown. To resume the execution of the program, click on "Execute" (Exhibit 28).

- Note #3: At the end of a program, the user can exit the program by clicking on "Menu" or re-launch the program by clicking on "Exec".

- Note #4: At any time, the currently selected flight domain can be visualized by clicking on "Domain".

- Note #5: The mode "Big Capacity" is only visible. You can not enabled or disabled it when the program is started.

- Note #6: At the end of a program, if the channels are not at the atmosphere pressure, you could go back to the ground pressure with the button "Ground".

3.2.4.3.2 File format for the data recorded by the semi-automatic program

At the end of the semi automatic mode, a text file, formatted to be opened with Excel, is created in the directory "C:\ADSE 743\Results\" with the format "XXXX YYYY ZZZZ.txt" where XXXX is the Name of program, YYYY corresponds to the date and ZZZZ corresponds to the time.

This example shows the "TOTAL 23_09_2010 05_49_34_PM.txt" file program opened with Excel.

This file is accessible by users allowed to access the underlying Windows XP operating system (see 3.3.11: Exiting the software). From there, the remote control unit is usable as a normal Windows PC.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	TOTAL																
2																	
3																	
4	23/09/10																
5	17:49:34																
6																	
7																	
8	OMICRON																
9																	
10																	
11	ALTITUDE PAS 2																
12																	
13																	
14																	
15																	
16	QFE = 1013.25 mb																
17																	
18																	
19	Delta Altitude = 0 ft																
20																	
21																	
22																	
23																	
24	Ps Mode	Ps Value	Altcoder (ft)	Ps rate	Ps Unit	Ps Read	Comments		Pt Mode	Pt Value	Pt rate	Pt Unit	Pt Read	Comments		Time Leak minute	Time Leak seconde
25	Measure	499	----	--	ft				Measure	0.0	--	Kts				--	--
26	Manual	10000	----	6000	ft	10010	Ok		Measure	408.8	--	Kts				--	--
27	Measure	9996	----	--	ft				Manual	300.0	300	Kts	299	Ok		--	--
28	Manual	5000	----	6000	ft	5010	Ok		Manual	200.0	150	Kts	199	Ok		--	--
29	Leak	909.33	----	--	hPa	-0.02	VALEUR FUITE PS		Leak	843.04	--	hPa	0.02			0	30
30	Ground	512		6000	ft				Ground	0.0	300	Kts				--	--
31																	

Exhibit 37

Spreadsheet cells content

- "A1": Program name
- "A4": Date of test
- "A5": Time of test beginning
- "A8": Field Name
- "A11": Field Comments

- "A16": Pressure reference configuration
- "A19": Altitude gap between the test set and the aircraft altimeter
- Line "25 to xx": Information step by step:
  - Column A: "Ps Mode" ->Measure, Manual, Leak, Ground
  - Column B: "Ps Value" ->Set point for altitude
  - Column C: "Ps Rate" ->Set point for rate of climb
  - Column D: "Ps Unit" ->Unit used for the altitude
  - Column E: "Ps Read" ->Value entered by the operator (or automatically in Leak mode in the unit used)
  - Column F: "Ps Comments" ->Comments entered by the operator
  - Column H: "Pt Mode" ->Measure, Manual, Leak, Ground
  - Column I: "Pt Value" ->Set point for airspeed
  - Column J: "Pt Rate" ->Set point for acceleration
  - Column K: "Pt Unit" ->Unit used for speed
  - Column L: "Pt Read" ->Value entered by the operator (or automatically in Leak mode in the unit used)
  - Column M: "Pt Comments" ->Comments entered by the operator
  - Column O: "Time Leak Minute" ->Indicates the leak test duration (minutes)
  - Column P: "Time Leak Second" ->Indicates the leak test duration (seconds)

3.2.5 Calibration mode

The calibration mode is accessible through a password.

The first step is to validate the date or enter the right date.

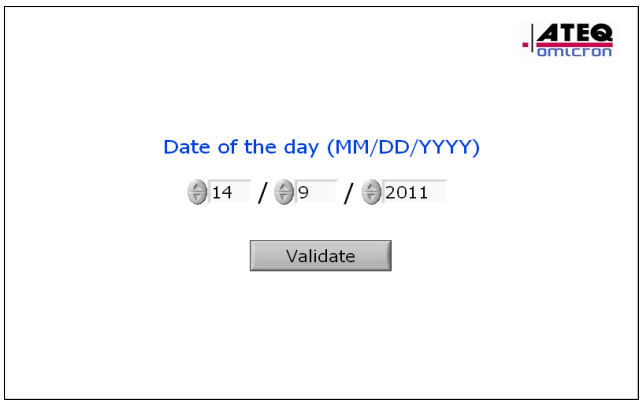


Exhibit 38

Choose the channel to be calibrated (Ps or Pt),

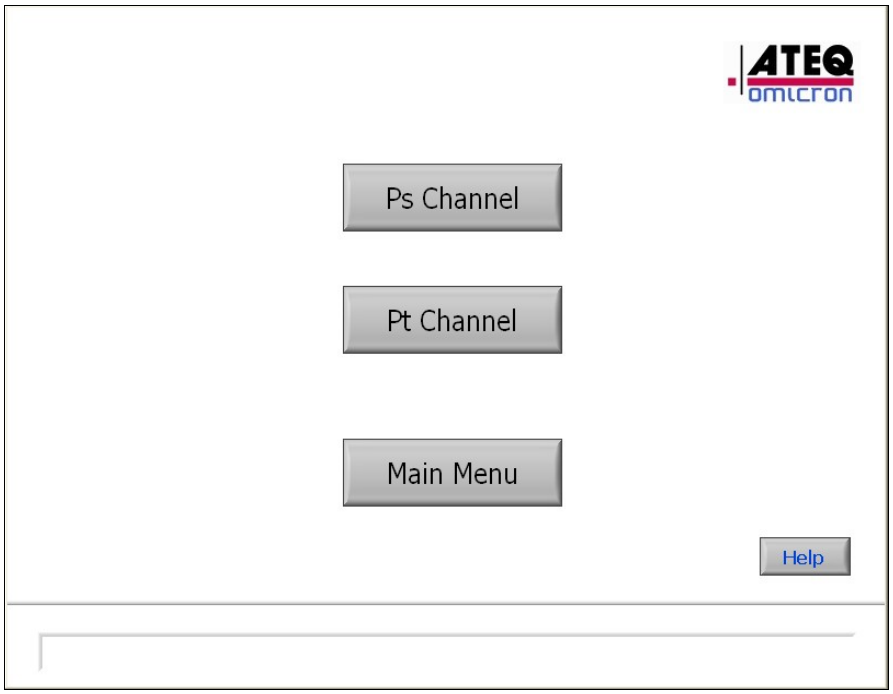


Exhibit 39

3.2.5.1 Calibrating the sensors

Calibrating the sensors of the ADSE650 requires a pressure standard in a climate controlled room with a temperature regulated between 20 and 25°C.

- Place the ADSE 743 in the climate controlled room, next to the pressure standard,
- Turn it on,
- Leave the equipment for at least 30 min to stabilize in temperature.

3.2.5.2 Operating mode

Choose the channel to be calibrated (Ps or Pt),

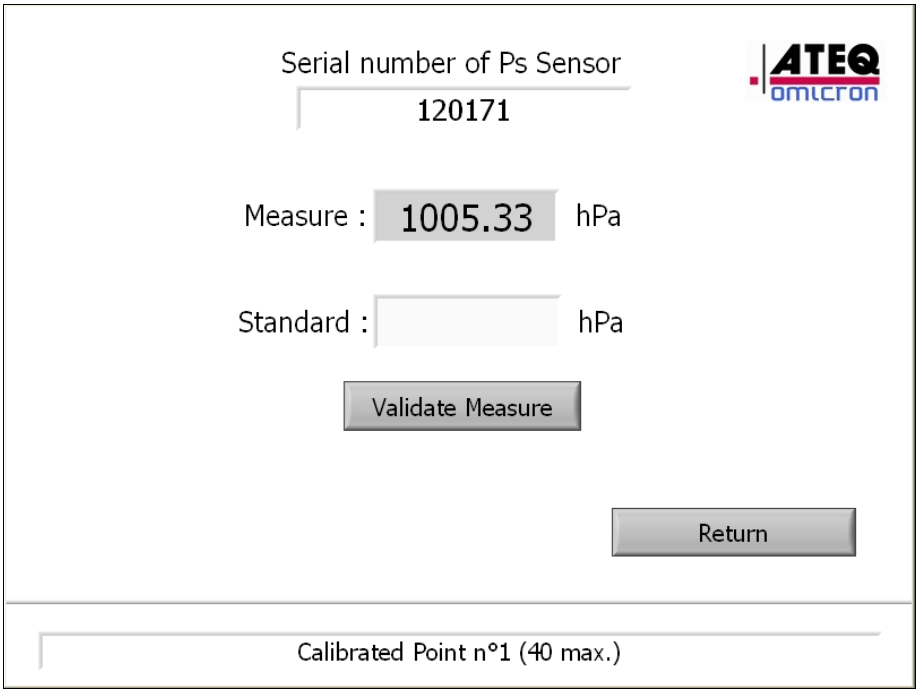


Exhibit 40

Different information are displayed on the screen:

- The serial number of the sensor,
- The uncorrected pressure measured by the sensor in the "Measure" field.

Three buttons are accessible as well as a data entry field "Standard".

The calibration procedure consists of:

- Generating controlled pressures with a pressure/vacuum generator connected on one of the Ps or Pt pneumatic connectors and to a pressure standard,
- Reading the value of the pressure standard and entering it in the "Standard" field with the digital keyboard which appears by clicking in this field.
- Click on "Validate Measure" to Validate the value entered.
- Validating the calibration once all points (pressure values) have been entered, by clicking on "Validate calibration".

When the calibration is validated:

- The data is saved in a backup file,
- The data is sent to the computer which takes into account these new parameters.

To obtain an optimal calibration of the equipment, *ATEQ-OMICRON* recommends to perform the calibration by measuring following pressure values:
On the Ps channel: 65, 100, 200, 300, 400, 500, 600, 700, 800, 900, 950, 1000, 1050, 1100, 1150 hPa.
On the Pt channel: 0, 5, 10, 25, 50, 100, 200, 300, 400, 500, 600, 700, 800, 900, 1000 hPa.

Note #1: The user can enter up to 40 pressure values per channel on the whole scale. These data must be entered starting from the minimum pressure upwards to the maximal pressure.

When the data has been successfully transferred to the computer, a message "Calibration OK" appears in the information window. If the transfer did not happen properly, a message "Calibration KO" appears. The data needs to be loaded again.
Click on the button "Load data". To validate the data transfer, click on "Validate" otherwise click on "Cancel".

The data transfer procedure resumes.

Note #2: If a calibration validation is requested but less than two calibration points have been validated, a control prevents this validation and an information window is displayed.

3.2.6 General Information

By clicking rmation is displayed:

- t software
  calibration
  ,
  - the wifi parameter,
- "Languages" allows to change the language of the software.

<u>Note 1:</u> On the bottom right, you can find the serial number of the ADSE650 on wich the TabletPC must communicate, the revision software of the EPU Boot and Application.

<u>Note 2:</u> On the top left, you have informations about TabletPC Battery.

3.2.6.1 Parameters

Exhibit 42

User Settings:

- "Password": To modify password,
- "Autotest threshold...": to configure the threshold for the leak during the Autotest
- "Display Unit Windows...": to configure the time in seconds to open the Unit windows in the application,

RS232:

- If you use the tool kit to communicate in RS232, the Com Port is indicate.

WIFI:

- SN ADSE650 : Enter the serial number of the ADSE.

  Configuration of the wifi network:

- IP Address : By default: 201.197.57.1
- Subnet Mask : By default: 255.255.255.252
- Default Gateway : By default: 210.197.57.1
- IP Port: 2000

3.2.6.2 Password

By default, when the equipment is delivered, the password is the serial number of the equipment.

By clicking on the "Config" button of the main menu and "Parameters", following information is displayed:

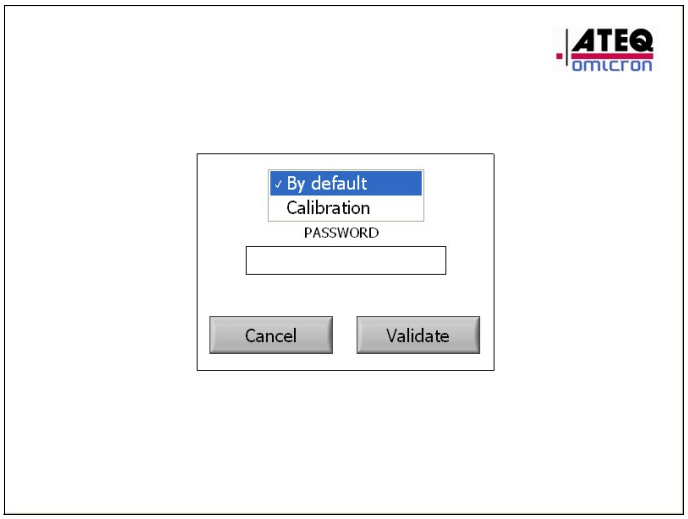


Exhibit 43

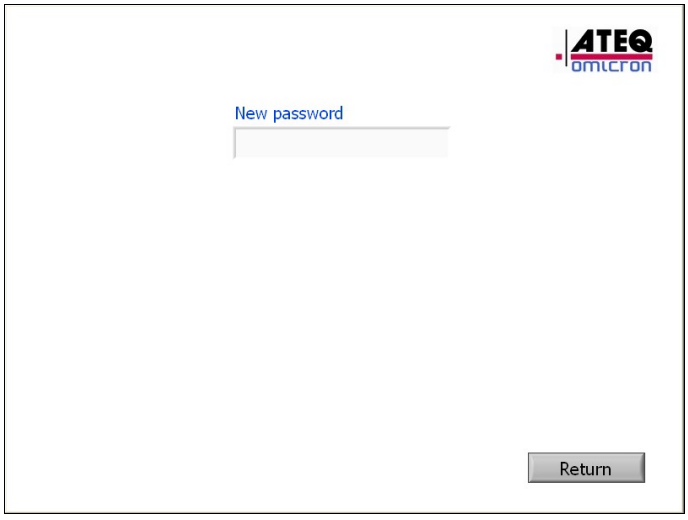


Exhibit 44

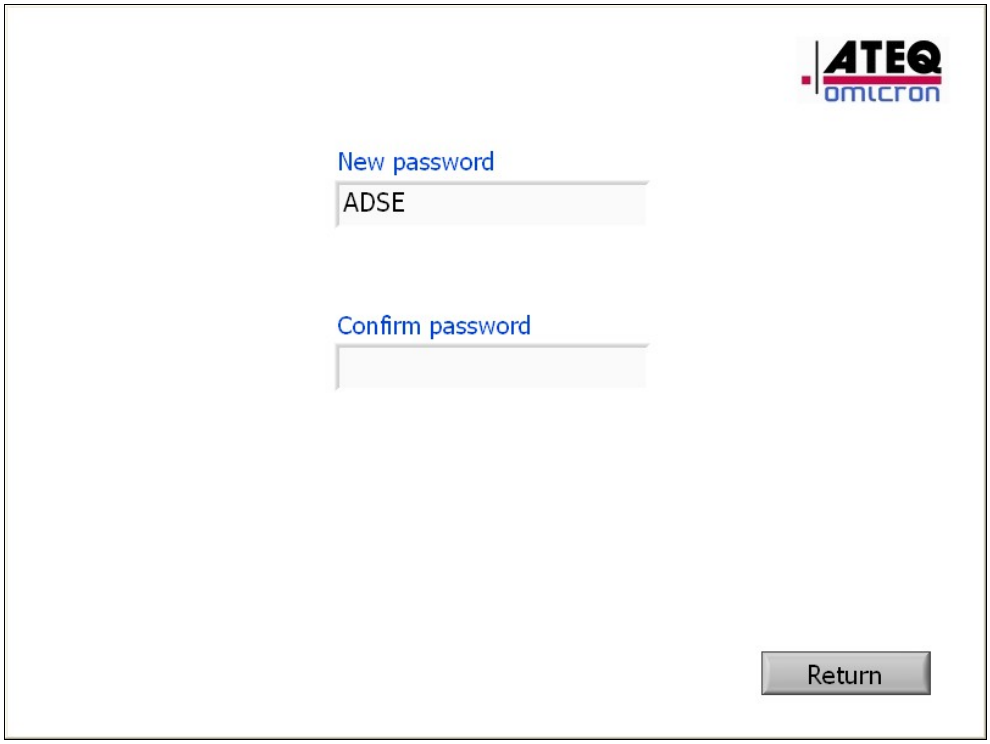


Exhibit 45

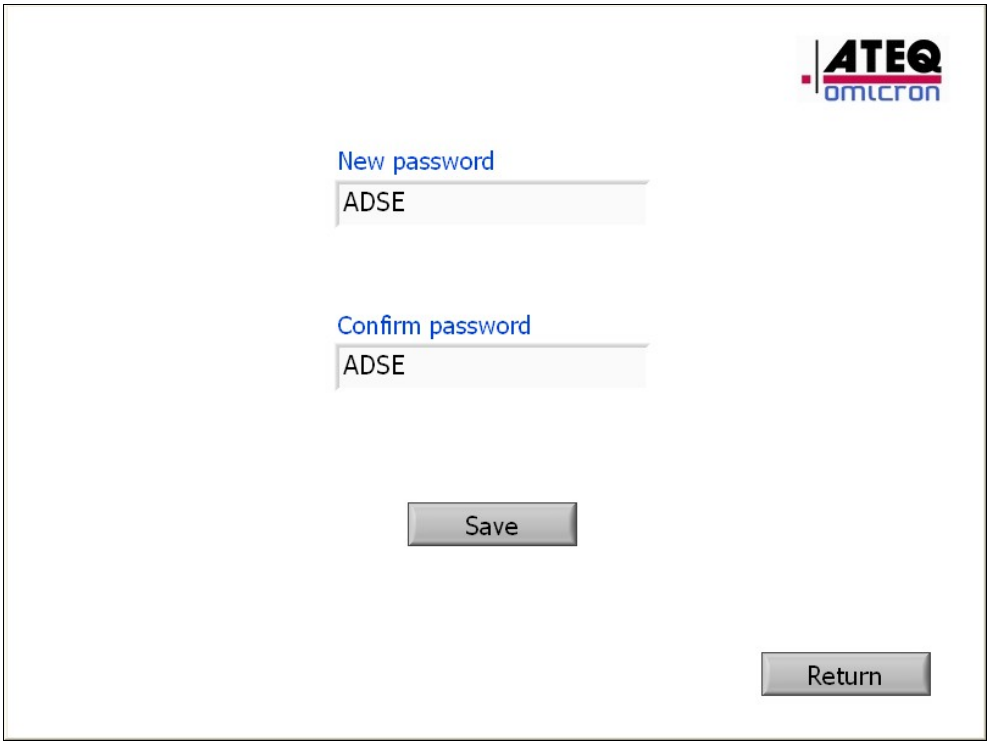
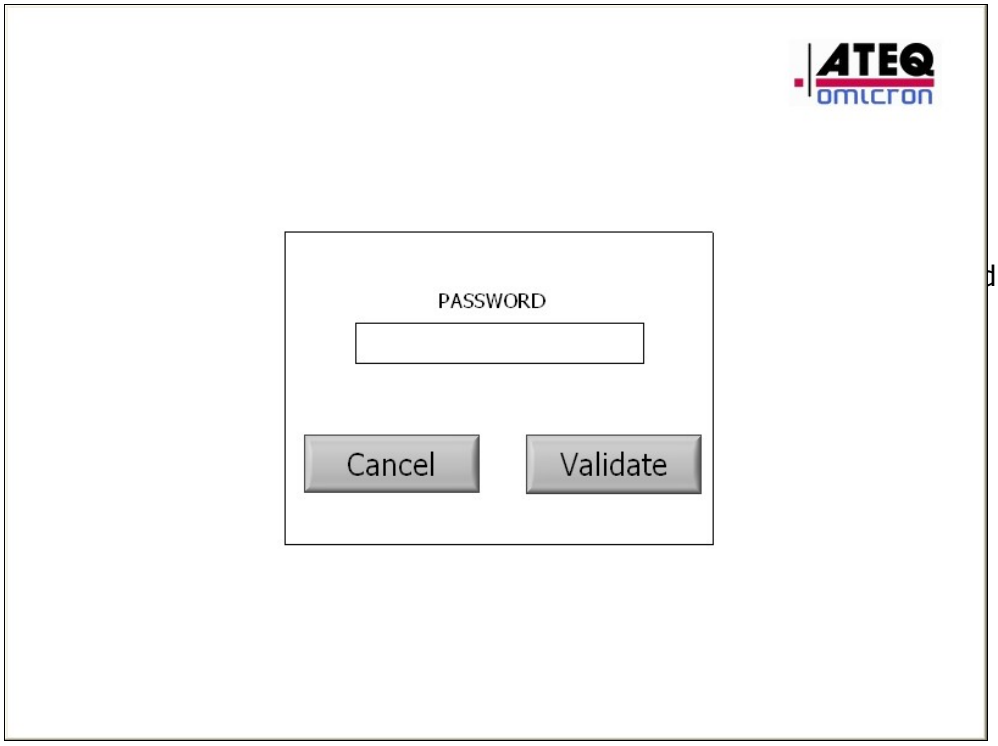


Exhibit 46

- Select "Calibration" to change the password of calibration Mode or "By default" to change the other password (To write or modify program, domain, to exit).
- Enter the current password by clicking in the field and using a alpha numeric keyboard,
- If the password entered is wrong, a message appears: "Incorrect password",
- If the password is correct, a window appears, where the user is requested to enter twice the new password and validate (Exhibit 45 and 46),
- If both passwords are different, an error message "The passwords are different" is displayed,
- If the passwords are identical, a window appears, requesting to validate the change (Exhibit 47),
- If the user clicks on "Return" without validating, the change is not taken into account.

3.2.6.3 Enter a password

When a



d,

3.2.6.4 Languages

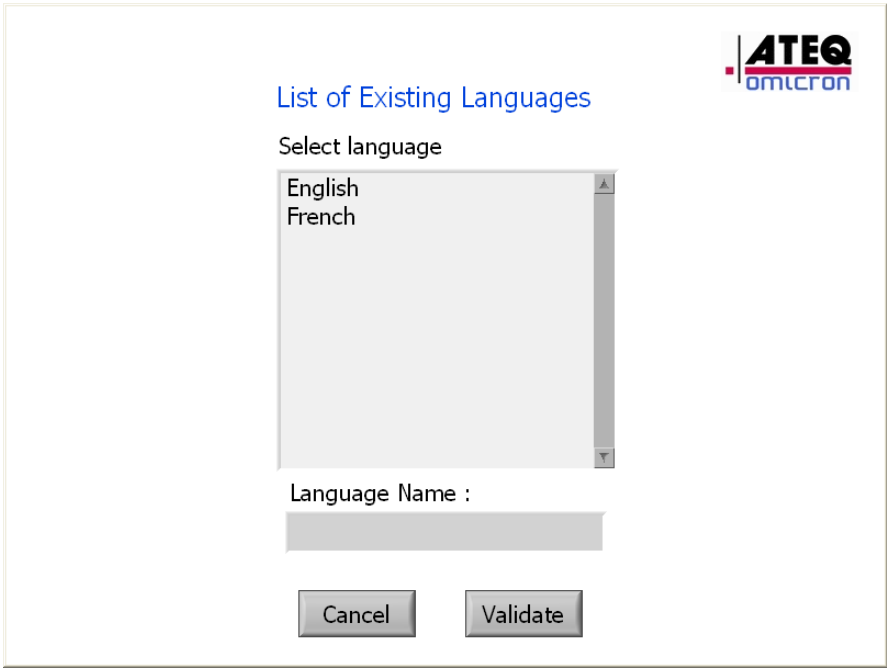


Exhibit 48

To change Languages:

- Select the desired Languages,
- Press "Validate" to change.

3.2.7 Help on line

The "HELP" button on the main menu open a html windows with the user manual.

3.2.8 Exiting the software

- To exit to the software and come back to Windows 8, click on "Exit" in the main menu, click “shutdown Software” and enter a password.
- To exit to the software and turn off the TabletPC, click on "Exit" in the main menu and click “shutdown Windows” and enter a password.

3.2.9 Keyboard configuration

To enter a numeric or an alpha-numeric value, 3 kinds of keyboards appear.

3.2.9.1 Digital keyboard

To enter a digital value, this screen is displayed:

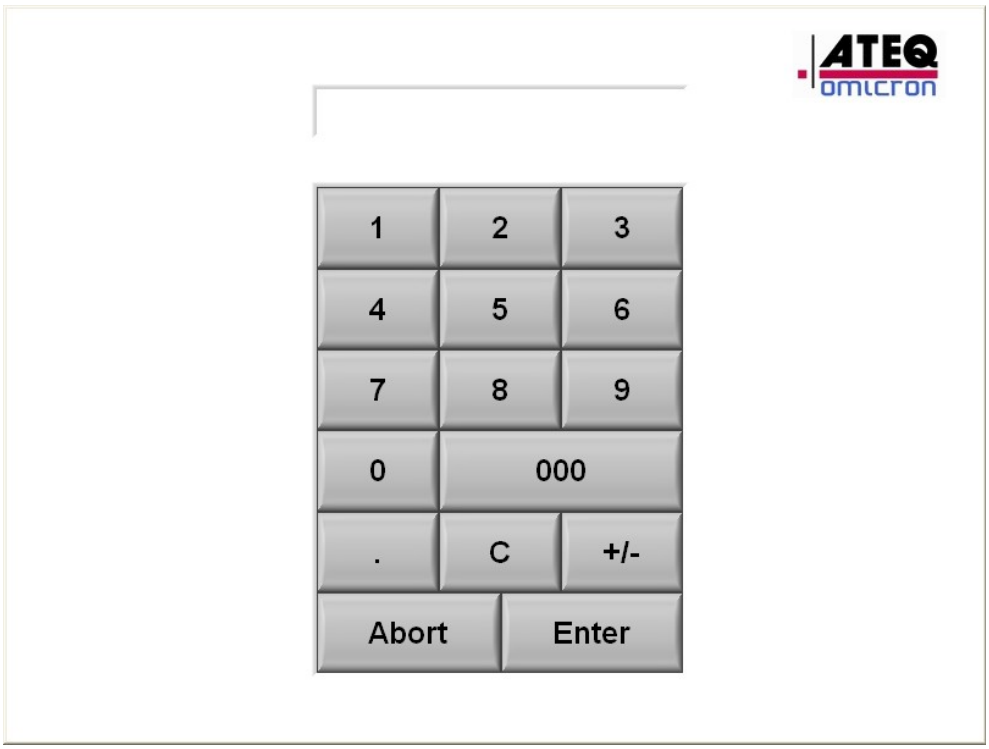


Exhibit 49

- Enter a value and validate by "Enter" or escape with hitting the "Abort" key.

3.2.9.2 Alpha-Numeric Keyboard

To enter an alphanumeric value, this screen displayed:

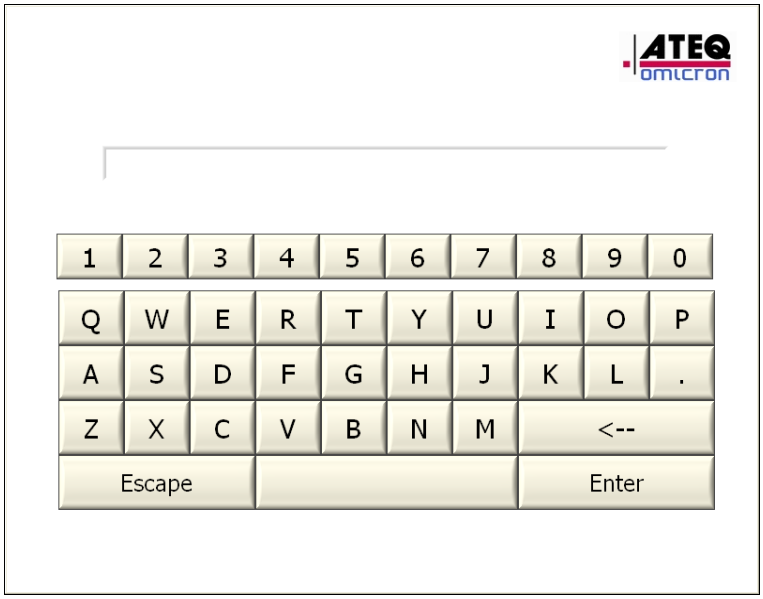


Exhibit 50

- Enter an alphanumeric value and validate by "Enter" or escape by "Escape"

Note: For password, Text is hidden as follows:

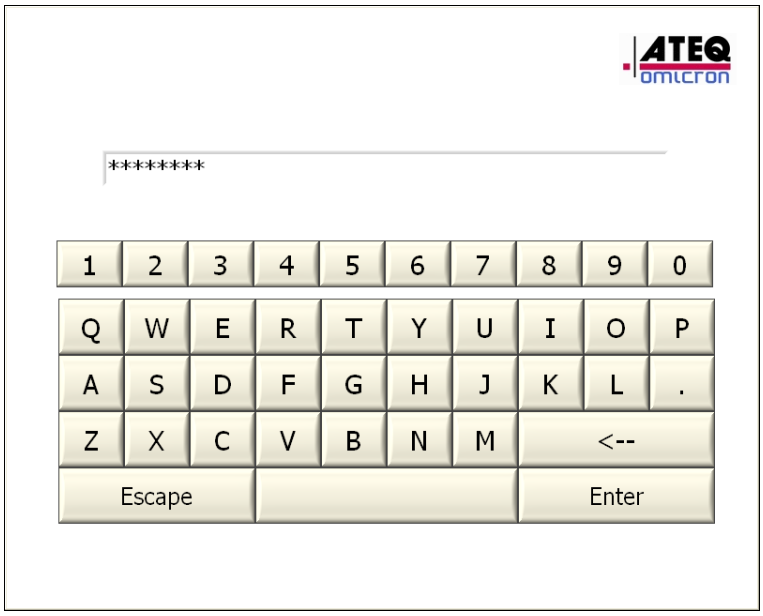


Exhibit 51

4. MAINTENANCE

4.1 Passwords

The initial passwords (upon delivery of the equipment) needed to access some secured menus are the serial number of the equipment.

4.2 Internal

Your ADSE 650 is engineered to give you full satisfaction for a large number of years. As it contains some components potentially subject to ageing (filters, membranes...) we recommend to follow the maintenance plan (in attachment), in order to ensure a perfect operation on the long run.

This maintenance plan is valid for a use in normal conditions of temperature, dust, moisture and salt, with only occasional use in very harsh environment. In the case of a permanent use in harsh conditions (equipment embarked permanently on an aircraft carrier, on an airbase in the desert...) we recommend to divide by two the time between two maintenances.

4.3 Low Level Maintenance

Housing: Clean every month with soft sponge (water and mild liquid detergent)

Front panels and touch screen: Clean every week with damp lint-free cloth and mild liquid detergent.

Note: NEVER USE AGRESSIVE DETERGENT OR SOLVENT

Electric Cable: Check the cable and connector before each use.

Pneumatic hose: Check hose and plug before each use.

Internal Leak: Check every month the internal leak of the ADSE.

4.4 Contacts

Do not hesitate to contact us, should you have any questions regarding the use and the maintenance of your equipment

4.4.1 Mailing address

ATEQ

15, rue des dames

78340 Les Clayes-sous-Bois

France

4.4.2 Internet

www.ateq.com

4.4.3 Telephone numbers

Switchboard:	+33 1 30 80 10 90
Telefax	+33 1 30 54 11 00

4.5 Maintenance

4.5.1 Autotest

After shipping or in case of doubt on the bench, the "Autotest" function checks the ADSE (limits and leaks).

This test, available in "program mode", runs automatically. At the end of the test, one window "Results" is displayed.

At the end of the test, the box is green if the test passed, red otherwise.
Two cases are possible:

- During the test, the ADSE has detected a problem with the generation. In this case, the test is stopped and a message corresponding to the problem is displayed at the bottom of the screen.
- One or more tests leaks are incorrect. Values implied appear in red in the results table.

CAUTION:

To run the Autotest:

- **disconnect any device (risk of damage),**
- **connect tubes on Ps and Pt and put the plugs accessories to close them.**

To Run Autotest :

In the menu "Automatic Program", press the Autotest button at the bottom left of the screen.

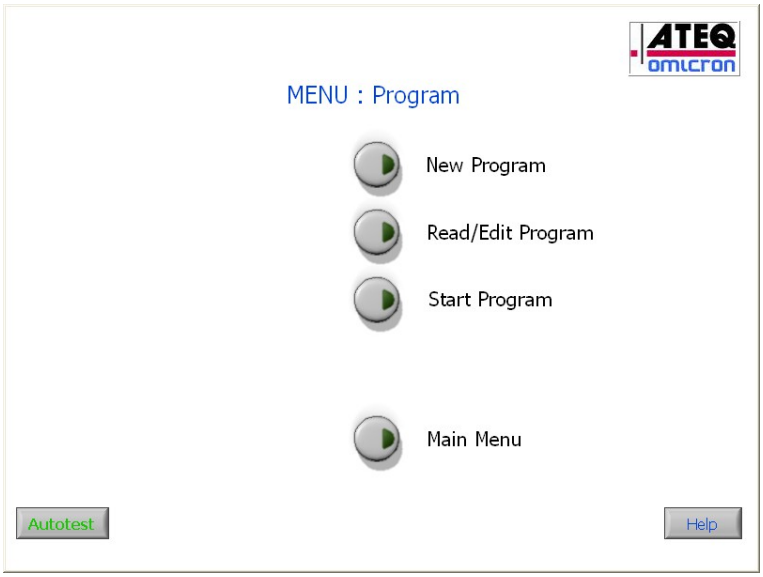


Exhibit 52

A window appears, requesting confirmation of the launch and giving instructions for the ADSE.

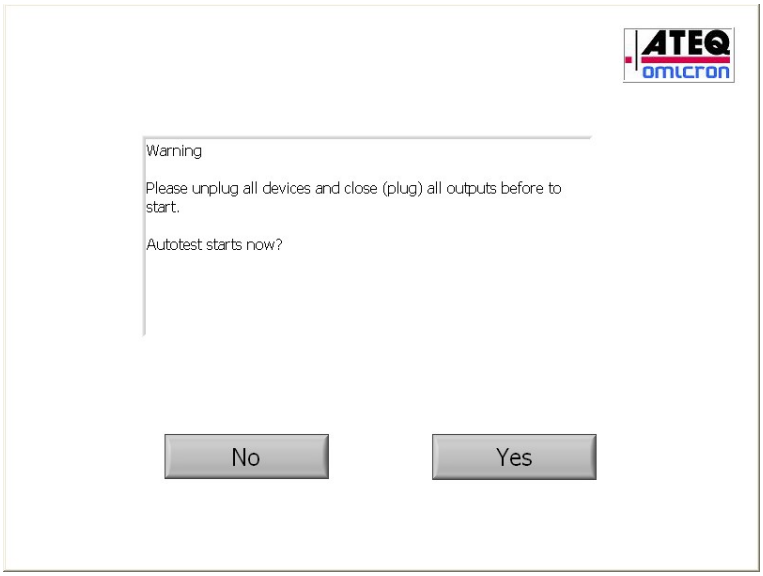


Exhibit 53

All steps appear and Autotest starts automatically.

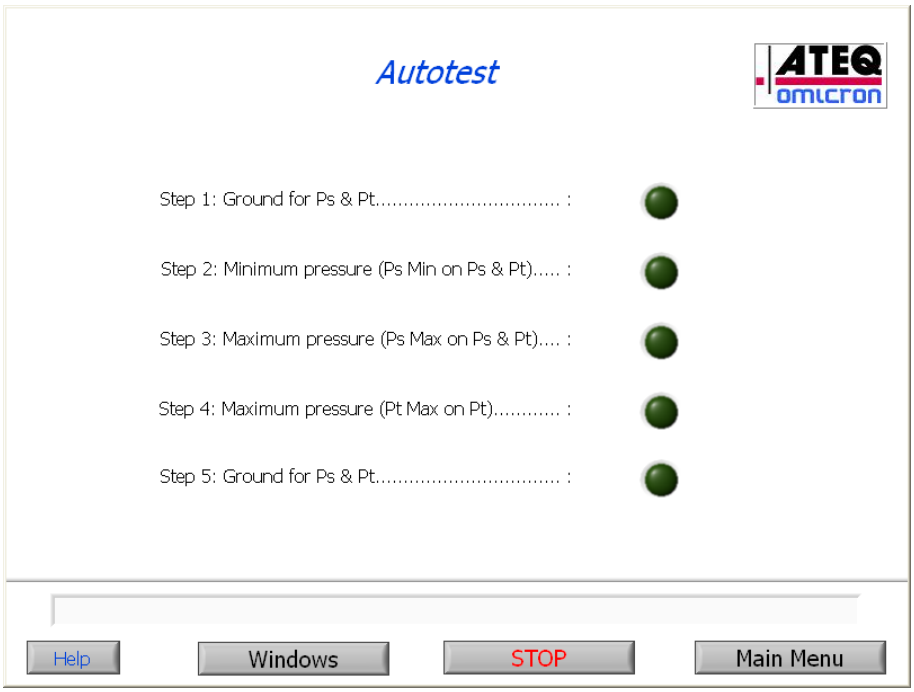

Autotest
Step 1: Ground for Ps & Pt..... :
Step 2: Minimum pressure (Ps Min on Ps & Pt)..... :
Step 3: Maximum pressure (Ps Max on Ps & Pt).... :
Step 4: Maximum pressure (Pt Max on Pt)..... :
Step 5: Ground for Ps & Pt..... :
Help
Windows
STOP
Main Menu

Exhibit 54

The active step is flashing in green during the test. At any time, the user can:

- see the graphs of measure for all channels by clicking on the button "Windows".
- stop the Autotest by pressing the "STOP" button. A "Ground" button replaces it and allows the return to atmospheric pressure on all channels, if applicable.

Examples of measures :

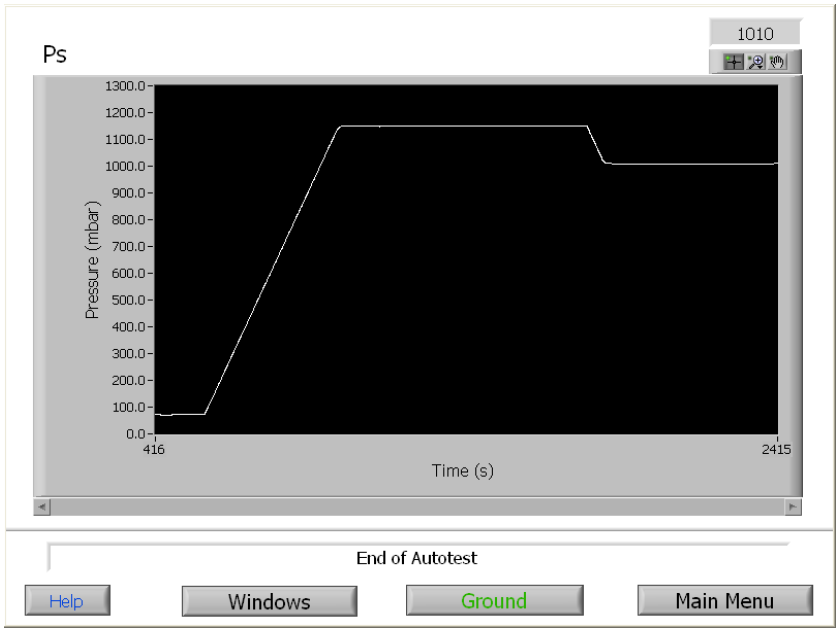


Exhibit 55

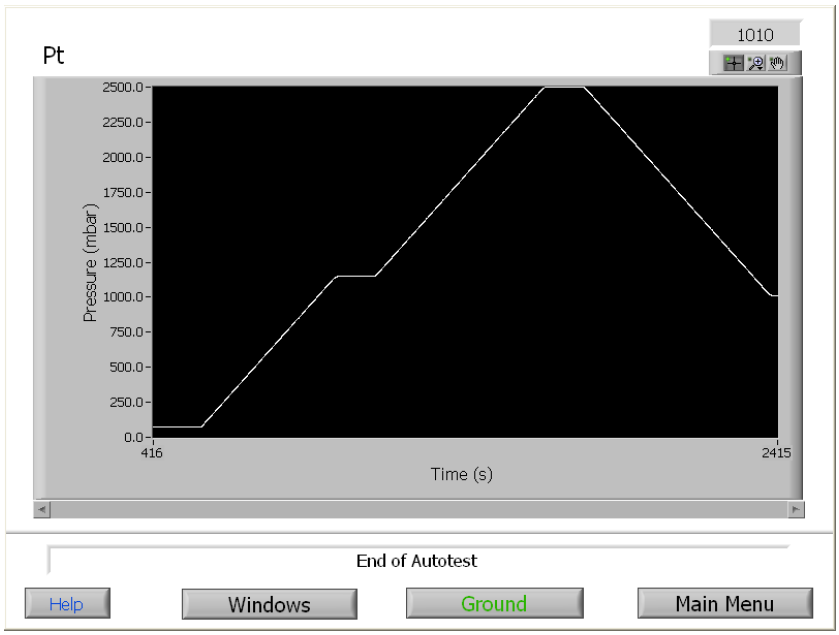


Exhibit 56

Note: To return to the Autotest menu press again the "Windows" button.

At the end of the Autotest, the result is given by a LED:

- Green: The bench is functional,
- Red: leak problem or malfunction.

Note: If the test is successful (result: green) all channels are at atmospheric pressure at the end.

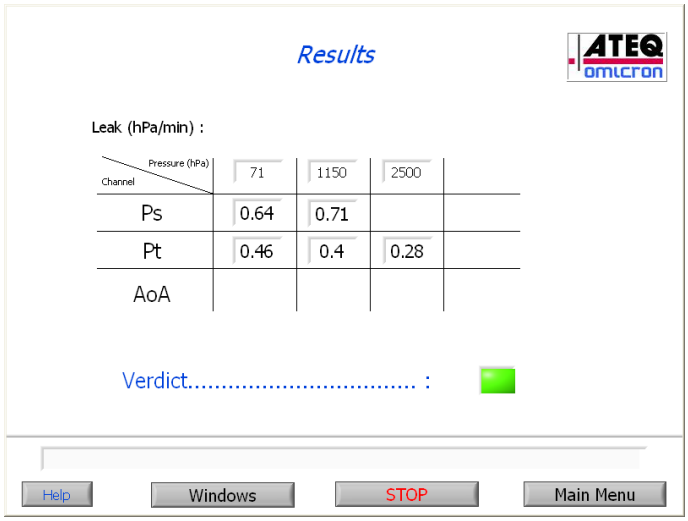


Exhibit 57

If it is a leak problem, the leak shows up in red.

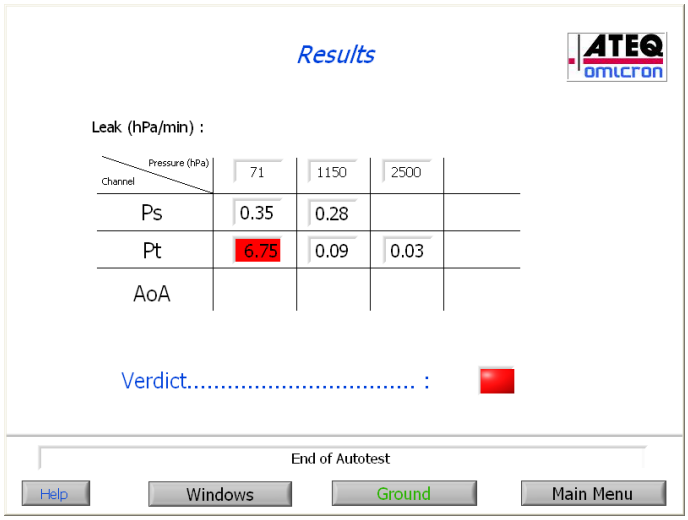


Exhibit 58

If a generation problem is concerned, a message indicating the problem shows up at the bottom of the screen.

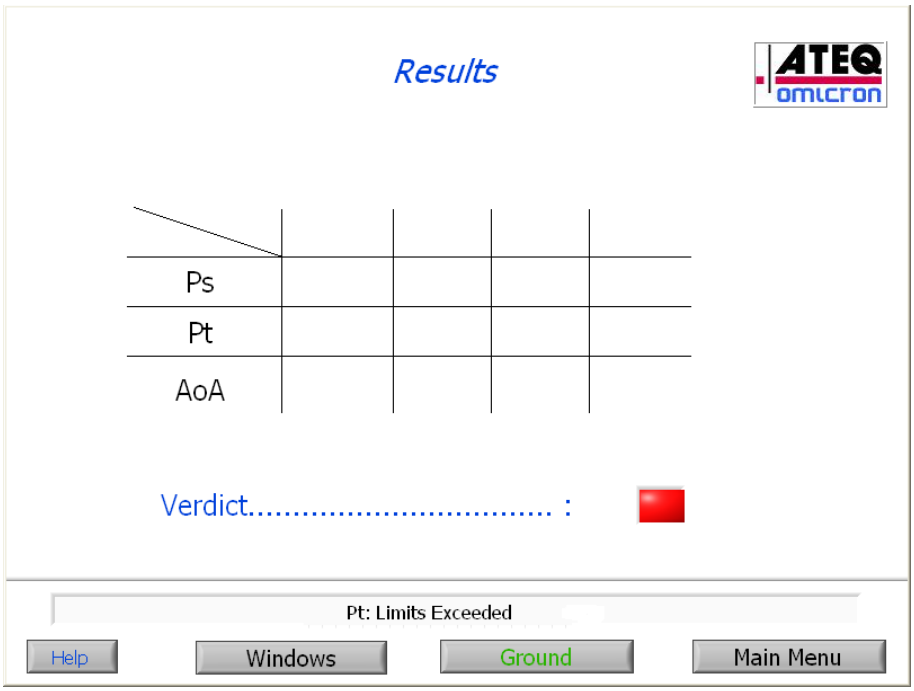


Exhibit 59

Note: If the test is stopped (result: red). The operator can, with the "Ground" button, go to atmospheric pressure for all channels.

4.5.2 Maintenance Plan

	Laboratoire agréé ou omicron Agreed Lab or omicron	Centre de réparation agrée ou omicron Agreed repair center or omicron	Chaque année Every year	Tous les deux ans Every two years	Tous les 4 ans Every four years
Calibration Calibration	X		X		
Changement des filtres de ventilation Fan filters exchange		X	X		
Changement filtres internes Internal filters exchange		X	X		
Vérification alimentation interne Internal voltage check		X		X	
Vérification pneumatique interne Internal pneumatic check		X		X	
Changement des pièces en caoutchouc Rubber part exchange		X		X	
Test des électrovannes Electrovalves test		X		X	
Test cartes électroniques Electronic board test		X		X	
Test connecteurs pneumatiques Pneumatic plug test		X		X	
Test connecteurs électriques Electric plug test		X		X	
Réglage vanne modulante Regulation valve adjustment		X		X	
Remplacement dalle tactile Touch screen exchange		T			T
Rénovation des électrovannes Electrovalves renovation		X			X
Remplacement connecteurs pneumatiques Pneumatic plug exchange		X			X
Test groupe de pompage Pump group test		P			P
Changement ventilateurs Fan exchange		X			X
Test des batteries Battery test		B		B	
Changement des batteries Battery pack exchange		B			B
Rénovation des électrovannes 3Ps 3Pt Electrovalves renovation 3Ps 3Pt		M			M

Notes:

X: pour tous les ADSE / for all ADSE equipment

B: pour les ADSE avec option pack batterie/ for ADSE with battery pack option only

M: pour les ADSE avec option multi-voies / for ADSE with multiple outlet option only

P: pour ADSE avec pompes internes / for ADSE with internal pumps only

T: pour ADSE avec écrans tactiles / for ADSE with touch screen

5. ANNEXE : Safety information

CAUTION: This unit contains an internal Lithium Polymer battery. The battery can burst or explode, releasing hazardous chemicals. To reduce the risk of fire or burns, do not disassemble, crush, pierce or dispose of the battery or the instrument in fire or water, do not short circuit or short the contacts with a metal object.

5.1 Operating environment

- Remember to follow any special current regulations any area, and always switch off your device when its use is prohibited or when it may cause interference or danger.
- Allow ventilation around the device when using it. Do not cover it that will reduce cooling.
- Connect the charger to a proper power source. The voltage requirements are found on the product case and/or packaging.
- Unplug it before attempting to service or clean it.
- **NEVER** charge a battery pack immediately after use and while still hot. Leave it cool down to ambient temperature.
- If the battery is fully discharge, a full charge must be done between 1 and 5 Hours. In other cases thanks to call the service after sales.
- If the battery is fully charge, the time of using in normal operation must be between 1 and 3 hours. In other cases thanks to call the service after sales.

5.2 Safety for Lithium Polymer battery use

If you see some smoke or some liquid out of the device, stop it immediately. Disconnect the device and place it in an isolated area for at least 15 minutes.
DO NOT USE THE DEVICE AGAIN.

In the unlikely event that the Lithium Polymer battery will ignite, **DO NOT** use water to extinguish the fire, take some sand or fire extinguisher described above.

Do not pierce, cut or **NEVER** compress the jacket of a Lithium Polymer battery. If the battery is swelling up or if the cover is damaged, **DO NOT USE AGAIN**. Replace with a new one.

Do not dispose of Lithium Polymer batteries to the dustbin.

A Lithium Polymer battery should be stored with a minimum charge of 30%. If you store completely discharged, it will quickly become unusable.

*The **ATEQ** Company disclaims any responsibility for damage sustained in case of non compliance with these safety instructions.*

*The **ATEQ** Company couldn't control the proper use of the battery for each customer (charge, discharge, storage etc.), It can not be held responsible for damage to persons and property.*

5.3 Important instructions (for service personnel only)

CAUTION: *Risk of explosion if battery is replaced by an incorrect type. Dispose of used batteries according to the instructions.*

*Replace only with the same or equivalent type recommended by the manufacturer **ATEQ-OMICRON**.*

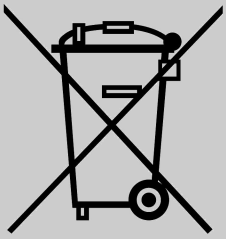
Charge the Lithium Polymer battery **ONLY** with the charger provided.

***NEVER** use a Ni-MH (Nickel Metal Hydride) type battery charger to charge a Lithium Polymer battery.*

The battery must be recycled or disposed of properly.

5.4 Recycling

Do not dispose of the rechargeable Lithium-Ion battery or the device to the dustbin.



These components must be collected and recycled.

The crossed-out wheeled dustbin means that within the EU the product must be taken to separate collection at the product end-of life. This applies to your tool but also to any enhancements marked with this symbol. Do not dispose of these products as unsorted municipal waste. For further information, please contact **ATEQ**.